An analysis of group VIII training

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AN ANALYSIS OF GROUP VIII TRAINING

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Monterey, California

THESIS

AN ANALYSIS OF GROUP VIII TRAINING

by

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and
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June 1976

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This paper analyzes and compares the methods by which training requirements for SEABEES (Group VIII ratings) are determined and training resources allocated. The major observation is that two different strategies exist. CNO (OP-099) tends to be concerned with the numbers of personnel on-board and the anticipated gains and losses, whereas CINCPACFLT and CINCLANTFLT view the problem in the near time frame, being concerned with deficiencies which may degrade SEABEE readiness. The approach taken is to

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first provide background data on the structure of the Group VIII ratings, the manner in which these personnel are employed, and the existing systems for managing their training. Training responsibilities are identified, and problems which exist in the current systems are presented. The analysis emphasizes environmental, cost, efficiency and management control factors.

AN ANALYSIS OF GROUP VIII TRAINING

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ABSTRACT

This paper analyzes and compares the methods by which training requirements for SEABEES (Group VIII ratings) are determined and training resources allocated. The major observation is that two different strategies exist. CNO (OP-099) tends to be concerned with the numbers of personnel on-board and the anticipated gains and losses, whereas CINCPACFLT and CINCLANTFLT view the problem in the near time frame, being concerned with deficiencies which may degrade SEABEE readiness. The approach taken is to first provide background data on the structure of the Group VIII ratings, the manner in which these personnel are employed, and the existing systems for managing their training. Training responsibilities are identified, and problems which exist in the current systems are presented. The analysis emphasizes environmental, cost, efficiency and management control factors.

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I. INTRODUCTION

The basic problem identified in this study is that two different strategies exist for the allocation of training resources in the Navy's Group VIII ratings. They are; (1) OP-099 tends to view SEABEE training from a broad viewpoint, giving principal weight to such variables as the numbers of on-board personnel, accessions, and attrition, and (2), the Fleets (CINCPACFLT and CINCLANTFLT) tend to appraise the training problem from a different perspective, being principally concerned with skill deficiencies that may impact on the unit's ability to perform its assigned mission.

As a result of these differing viewpoints, two separate training systems have evolved. This has led to a situation where training plans and programs of the Fleets and OP-099 are each developed on a more or less unilateral basis. Within the recent past, there has been a concerted effort to coordinate the training programs through improved communication and cooperation, yet the maximum benefit possible from these efforts is frustrated by a lack of a common denominator for stating training requirements, goals, and objectives.

The Navy is currently in a period of decreasing budgets and programs in all areas are being considered for reduction. Programs which cannot be justified based on firm and defendable requirements are likely candidates for reduction or elimination. Group VIII formal training programs are being critically reviewed, particularly -School. These schools are vulnerable because requirements

can presently be expressed only in subjective terms. There is a danger of making vertical cuts which will eliminate essential elements of training.

The units in the Naval Construction Force (NCF) provide training to their personnel through fleet and formal training. Fleet training is usually designed to maintain or improve skills already learned, to prepare personnel for changing mission requirements, for contingency needs, or for specific skill areas needed to accomplish upcoming construction projects. As funding support for various formal training programs diminishes, Fleet training needs are increased because personnel become less proficient. This leads the NCF community to increase Special SEABEE Training courses (SCBT), crew training, factory and other training to improve overall skill levels. The problem is that accomplishing of occupational training through Fleet resources may possibly not be the most efficient means to do so, and may, in fact detract from other operational objectives. A second problem is that training received through SCBT is sometimes duplicated when the individual attends the formal schools because SCBT courses are, in most cases, derived directly from formal courses. The training programs can be streamlined if this duplication can be identified and eliminated.

A single management control system that will serve the needs of both the Fleets and the formal training commands is needed. The system should account for skill inventory levels and permit projecting of training requirements based on known budget constraints, anticipated changes to the Naval Construction Force, requirements of upcoming deployments, and changing contingency demands.

II. BACKGROUND

Prior to undertaking a detailed analysis of the Group VIII training programs, the environment in which these systems operate should be discussed. This chapter describes the Group VIII ratings and the way in which they are employed, reviews the overall training structure for the SEABEES and the Navy as a whole, and investigates the parameters within which the Group VIII training system must exist.

A. THE NAVY ENLISTED OCCUPATIONAL GROUPS

Within the Navy, enlisted personnel resources and enlisted personnel requirements are identified primarily in terms of broad occupational skill categories, termed ratings. A rating defines an enlisted career field which requires similar aptitudes, knowlege, and training. Collectively, the individual ratings form the Navy enlisted rating structure, which is the fundamental tool for the management of enlisted personnel resources. In general, Navy enlisted personnel are advanced in grade, trained, and distributed by rating. In order to manage the 67 general ratings in the Navy Occupational Structure, the ratings have been grouped for management and control purposes into 11 rating groups as shown in Table I. While this study is limited to the Group VIII or Construction Group, it should be noted that the Naval Mobile Construction Battalion, (NMCB), has a personnel allowance which includes other ratings as well. Since roughly 85% of the NMCB allowance is

from the Group VIII community, the majority of the training program ccncerns these personnel.

TABLE I

NAVY OCCUPATIONAL GROUPS

GROUP	RATINGS INCLUDED
I, Deck Group	BM, QM, SM, OS, ST, EW, OT MA
II, Ordinance Group	TM, MN, GM, MT, FT
III, Electronics Group	ET, DS
IV, Precision Instrument	IM, OM, PI
V, Admin and Clerical	RM, CT, YN, PC, PN, JO, DP SK, SH, DK, LN, NC, MS, IS
VI, Miscellaneous Group	LI, DM, MU
VII, Engineering and Hull	MM, EN, MR, BT, BR, EM, IC PM, ML, HT, GS
VIII, Construction	EA, BU, SW, CE, UT, CM, EO
IX, Aviation	AV, AF, AD, AT, AX, AW, AO AQ, AC, AB, AE, AM, PR, AG TD, AK, AZ, AS, PH, PT
X, Medical Group	HM
XI, Dental Group	DT

Source: Department of the Navy, Navy Military Personnel Statistics, NAVPERS 15658, 30 September, 1973

B. THE GROUP VIII, (CONSTRUCTION), RATINGS

The Group VIII ratings of the Navy are made up of the seven skill areas required for the construction mission of the Naval Construction Force. Essentially, the personnel who possess these ratings must be able to perform at a level comparable with their civilian counterpart of apprentice, journeyman, etc. The numbers of individuals in each of the ratings will vary with the overall Navy strength level. Table II is a compilation of personnel strength by rate and rating for the Group VIII personnel. A brief description of the Group VIII ratings follows:

Builder, (BU): Builders construct, maintain, and repair all types of wood and concrete structures. In addition, they perform such auxiliary functions as shoring, underpinning, pile jettying, and capping. They operate sawmills, carpenter and cabinetmaking shops, and mix and place concrete in all types of structures including underwater installations.

Construction Electrician, (CE): Construction Electricians install, operate, maintain and repair electrical generating equipment, distribution systems, transformers, switchboards, distribution panels, motors, inside wiring, and lighting fixtures. They erect and maintain power and communication lines, and install, operate, maintain, and repair communication equipment.

Construction Mechanic, (CM): Construction Mechanics maintain, lubricate, repair, and overhaul automotive and heavy construction equipment and diesel and gasoline internal-combustion engines to insure efficient mechanical operation. They operate the various types of garage

equipment for moving and testing automotive machinery.

Engineering Aid, (EA): Engineering Aids duties include making reconnaissance, preliminary and final location surveys for roads, airfields, pipelines, ditches, buildings, drainage structures, and waterfront construction. Engineering Aids adjust, clean and maintain levels, transits, alidades, and other equipment. Their duties include making hydrographic, topographic, and triangulation surveys, maps, and profiles. They compute the amount of material to be moved in cuts and fills and lay out all types of construction work.

Equipment Operator, (EO): Equipment Operators dispatch, operate, fieldcheck, and service automotive and heavy construction equipment such as buses, trucks, tractors, shovels, cranes, scrapers, pile drivers, ditchers, rollers and graders. They rig cable assemblies and change attachments (blades, backhoes, clamshell buckets) to adapt construction equipment to various types of operations such as heavy digging, scraping, pushing, or pulling.

Steelworker, (SW): Steelworkers rig and operate all the special equipment used to move or hoist structural steel, structural shapes, and similar materials. Steelworkers erect or dismantle steel bridges, piers, buildings, tanks, towers, and other structures. They place, fit, weld, cut, bolt and rivet steel shapes, plates, and built-up sections used in the construction of advance-base facilities.

Utilitiesman, (UT): Utilitiesmen maintain and repair boilers, evaporators, and related equipment for the distillation and purification of water. They maintain and repair boilers, pumps, condensers, engines, and perform the plumbing and pipe-fitting work required in the maintenance of this equipment. They make chemical tests to determine the safeness of water, and maintain and operate water supply and sewage disposal plants or installations.

TABLE II

GROUP VIII MANNING STATUS AS OF 31 JULY, 1975

(LESS E-9 AND NON-DESIGNATED STRIKERS)

ALLOWANCE

Rating	E-7/8	E-6	E-5	E-4	E-1/3	Total
EA	35	69	85	68	26	283
CE	127	250	395	295	108	1175
EO	179	377	434	488	242	1720
CM	129	279	349	318	148	1223
BU	261	440	593	599	302	2159
SW	104	169	157	199	89	718
UT	114	229	338	277	103	1061
Total	949	1813	2351	2244	1018	8375

ON-BOARD

EA	32	74	123	128	123	480
CE	134	245	406	376	411	1572
EO	194	360	504	544	971	2573
CM	139	266	379	348	424	1554
BU	252	431	573	749	943	2948
SW	116	169	157	191	239	872
UT	137	217	315	338	498	1505
Total	1004	1762	2455	2674	3609	11504

Source: PRCP Group VIII Strength and Allowance Report, 31 July 1975.

. ASSIGNMENT OF GROUP VIII PERSONNEL

Personnel in the construction ratings may be assigned to wide variety of units in the Naval establishment. The ypes of shore duty available include staff duty at one of he NCF related staffs, public works related duty as a ember of one of the Construction Battalion Units, and other uch billets. Sea duty is most frequently encountered as a ember of one of the Naval Mobile Construction Battalions or he Amphibious Construction Battalions:

1. Active Naval Construction Force

The term Naval Construction Force, (NCF), is used to escribe the commands, regiments, battalions, units, and eams which are under the administrative control of the ommander, Naval Construction Battalions, Pacific Fleet, COMCBPAC), and the Commander Naval Construction Battalions, tlantic Fleet, (COMCBLANT). These include:

a. Naval Mobile Construction Battalions

The NMCB is the major recipient of Group VIII ersonnel. As the primary operational unit of the Naval onstruction Force, the NMCB's are charged with the esponsibility to maintain a state of readiness adequate to espond to a wide variety of contingency missions in support f U.S. and friendly forces, [Ref. 1]. In addition, the MCB's have a peacetime mission requiring them to maintain ritical construction skills by constructing Fleet support acilities throughout the world. NMCB's are commissioned

units under the operational control of the Commander-in-Chief, U.S. Pacific Fleet, and the Commander-in-Chief, U.S. Atlantic Fleet. This operational control is exercised through COMCBPAC and COMCBLANT. At the height of the RVN conflict, the Naval Construction Force had 22 active NMCB's manned at more than 1000 men each. In FY-1976, the number of active NMCB's is authorized at 8, manned at 563 Enlisted and 22 Officers each.

b. Naval Construction Regiments

The NCR is a headquarters command and control organization with the mission to coordinate and control the operations of 2 or more NMCB's in a theater of operations. At present, the Thirtieth Naval Construction Regiment, homeported on Guam, is the only remaining operational regiment in the active NCF. However, two training regiments exist, one at Port Hueneme, California and the other at Gulfport, Mississippi, the homeports of the Pacific and Atlantic NMCB's. These regiments provide support and assistance to the NMCB's at homeport and project material procurement and equipment management for deployed battalions.

c. SEABEE Teams

SEABEE Teams are specialized and highly trained 13-man civic action teams which are derived from NMCB resources, trained as units, and deployed to remote areas of the Trust Territories of the Pacific Ocean.

d. Underwater Construction Teams

The Underwater Construction Teams are operational Fleet units trained in the normal Group VIII rating skills and capable of operating in the underwater environment as well. The members of the UCT are qualified Navy divers. UCT's provide underwater construction support to the Navy wherever this specialized talent is needed.

2. Other Organized Units

In addition to the units within the Naval Construction Force described above, there are three additional types of SEABEE units which should be included in any analysis of training for Group VIII ratings. The following are numbered Fleet or shore based units of the Navy, and have a high percentage of Group VIII personnel.

a. CBMU 302

Construction Battalion Maintenance Unit 302, located at Subic Bay, Republic of the Phillipines, is the only active unit of this type. Its contingency mission is to provide public works and public utilities support at advanced bases. During peacetime, it is involved with back-up support for public works centers and public works departments at overseas commands.

b. Construction Battalion Units

CBU's are small shore-based units located at major Naval installations throughout the United States. The mission of these units is to provide self help support to the Navy. Personnel are assigned to these units for a normal tour of shore duty. Since these units do not deploy,

training is normally done in connection with permanent change of station orders, where the individual is ordered to a Naval Construction Training Center, (NCTC), prior to reporting to the ultimate duty station. A listing of the CBU's is provided in Table III.

c. Amphibious Construction Battalions

ACB's are Fleet units under the operational control of the Amphibious Commanders of the Atlantic and Pacific Fleets. The two ACB's are smaller in size than NMCB's and contain a smaller percentage of Group VIII ratings. The mission of the ACB is to provide inshore construction support to the amphibious force during an amphibious assault.

3. Shore Stations

Group VIII personnel are assigned to Continental United States, (CONUS) and overseas shore duty in a variety of billets. They are usually assigned to billets which utilize their occupational rating skills.

4. Reserve Naval Construction Force

The term Reserve Naval Construction Force describes the collective commands and units under the command of the First Reserve Naval Construction Brigade, (COMFIRSTRESNAVCONSTBRIGADE). This force consists of 17 Reserve NMCB's, 8 Reserve NCR's, and the brigade headquarters staff. Upon mobilization, these units are capable of deploying with a minimum amount of readiness training. These units conduct annual active duty for

training as organized units, frequently at one of the Naval Construction Battalion Centers.

TABLE III
CONSTRUCTION BATTALION UNITS

Unit	Location
401	Naval Training Center, Great Lakes, Ill.
402	Naval Air Station, Pensacola, Fla.
403	Naval Academy, Annapolis, Md.
404	Naval Air Station, Memphis, Tenn.
405	Naval Station, San Diego, Cal.
406	Naval Air Station, Lemoore, Cal.
407	Naval Air Station, Corpus Christi, Tex.
410	Naval Air Station, Jacksonville, Fla.
411	Naval Station, Norfolk, Va.
412	Naval Station, Charleston, S.C.
413	Naval Station, Pearl Harbor, Hi.
414	Naval Submarine Base, New London, Conn.
415	Naval Air Station, Oceana, Va.
416	Naval Station, Alameda, Cal.
417	Naval Air Station, Whidbey Island, Wa.

Source: Department of the Navy, Naval Facilities Engineering Command, Civil Engineer Corps Directory, NAVFAC P-1, Summer, 1975.

D. SKILL MANAGEMENT SYSTEMS

The Navy rating structure is supplemented by the Navy Enlisted Classification, (NEC), coding system, the Personnel Qualifications Standards, (PQS), and the Personnel Readiness Capabilities Program, (PRCP). Each of these programs or systems attempts to identify skills in specific terms such that they can be accounted for through an inventory management process.

1. Navy Enlisted Classification System

The NEC with its respective code provides more specific identification of technical skills within the scope of the ratings. An NEC is a four-digit identifier assigned to both enlisted personnel and enlisted billets. When assigned to personnel of a rating, it identifies special skills or training beyond that generally associated with the rating. When assigned to a billet, the NEC identifies a special requirement of that job. In many cases, in order to become qualified to fill a billet with an NEC requirement, a man must attend a formal course of instruction, [Ref's 2 and 3].

2. Personnel Qualification Standards

Personnel Qualification Standards (PQS) are a written compilation of knowledge and skills derived from task analysis and required to qualify personnel for a specific watch, station, or to perform as a team member within an assigned unit, [Ref. 4]. The PQS has been

esigned as a qualifications guide for trainees together ith a record of individual progress and certification. PQS s designed specifically to assist in watchstander ualification of personnel in highly complex shipboard ystems. In most cases, it is operator oriented. PQS has ot been implemented within the NCF because PRCP ccomplishes basically the same purpose and is currently ully operational.

3. PRCP

The Personnel Readiness Capabilities Prcgram, PRCP), is an operational computer-based system which dentifies Mcbile Construction Battalion skill requirements nd maintains a current inventory of the skills within the MCB's, [Ref. 5]. In the PRCP, skills common to each rating ave been defined in a set of Manuals called nterviewer's Standards and Guides, [Ref. 6]. These skills re given an identification number and a descriptive title nd are defined according to skill level 1, 2, or 3, where evel 1 is the lowest and level 3 the highest degree of roficiency in a particular skill. For example, Builder kill 140, level 1 can be acquired either through on-the-job raining, ccmpletion of a special SEABEE training ccurse, or hrough A-Schcol. An individual with skill 140, level 3 ust have ccmpleted C-School and hold NEC BU-5902, Masonry echnician. Some PRCP skills have only one skill level, thers have two or three levels.

CCMCBPAC and COMCBLANT have promulgated Reference 7, hich sets fcrth the specific skills which each NMCB should ossess. These skill requirements, identified by escriptive title, PRCP skill identification, and NEC Code, re shown in Appendix B. The number of skills, skill evels, and training requirements specified in the

nstruction reflect the Fleet commands best estimate of the skills that will be necessary for NMCB operations in contingency situations.

Based on the inventory and requirements data levelcped from the material thus generated, the PRCP reporting system provides continually updated reports on a nit's readiness condition. The overall system includes; 1) A comprehensive statement of skill requirements, (2) An ccurate inventory of existing skills, and (3) An automated ata processing capability to process the data. Each ndividual NMCB prepares PRCP transcript masters for each ember of the unit, which are forwarded to the computer acilities at Port Hueneme and converted to sequentially iled data banks from which punch cards are prepared and eturned to the unit. The unit then can use its keysort apability tc retrieve data for its own use.

The Civil Engineering Support Office (CESO), lccated t the Naval Construction Battalion Center, Port Hueneme, is esponsible fcr the technical aspects of the PRCP. The data rocessing facility at CESO is used to combine data frcm the nit with data from the BUPERS master tape to generate everal reports of use to SEABEE planners. Sample pages rcm the PRCP Skill Strength Report, NEC Strength Allowance eport, and NEC Exception Reports are shown in Figures 1, 2, nd 3. The formats for these reports are as follows:

a. PRCP Skill Strength Report

Line	Line Description
1	Report heading and date
2 / 3	Facilities Support Office (FACSO) Report/Symbol number, report title, GEMS report number, and page number.
4	Activity or Unit.
5 / 6	Column Headings.
7	Skill Title.
8	Level three skills.
9	Level two skills.
10	Level one skills.
11	Total skills.
7 - 12	Repeated as applicable to complete page.

Column	Column Description
1	SKILL LEVEL (PRCP skill level).
2	STD REQT (Standard Requirement). The standard requirement is based on a percentage of on-board personnel in the individual rating groups. Percentages used to determine the standard requirements are contained in Ref. 7.
3	MIN REQT (Minimum Requirement). The minimum requirements are stated in Ref. 7.
4	PROJ REQT (Project Requirement). This column is for use by the unit to indicate a deployment project or special project req'mt which exceeds the standard requirement for the skill.
5	COB. Current on-board as of the date of the report. This column is sub-divided into two sections; BASE and OTH (other). For the Group VIII rating sections of the report, counts for the individual Group VIII rating skills, except E9, appear under the BASE column and the skills of other ratings, including E-9, appear under OTH.
6	POB 3. Projected on-board three months from date of report.
7	POB 6. Projected on-board six months from the date of the report.
8	POB 9. Projected on-board nine months from date of report.
9	POB 12. Projected on-board twelve months from date of report.
0 / 11	COMPARISON STD TO POB 6. The number of excesses or shortages for each skill qualification projected to be on-board six months from the date of the report is compared with the standard requirement according to Ref. 7. The percentage of skill qualifications for personnel projected to be on-board with respect to standard requirements is also displayed.
2 / 13	COMPARISON PROJ TO POB 6. The same information as above except the projected on-board count is compared with a PROJECT requirement. In the event a deployment or special project requires skills beyond the standard req'mt, the unit can enter the project requirement and this column will be displayed.

b. NEC Strength and Allowance Report.

Line Descriptions

ine 1	Report title and date.
ine 2.	FACSO report symbol, GEMS report no. and page number.
ine 3.	Activity or Unit.
ines 4/5	Column Headings.
ine 6	NEC Code Number and NEC Allowance according to OPNAV approved manpower authorization.
s Req'd	Listing of personnel possessing the NEC
ines following above:	RATING TOTALS. Summary by rating of personnel possessing the NEC, the Req'm't, and the OPNAV approved allowance. Column headings for this section appear across the bottom of the page.

Upper Column Headings

Column	Column Description
1	NAME. Name of individual holding NEC.
2	SSN. Social Security Number.
3	RATE. Rating abbreviation.
4	DISTR RATE. Distribution rate.
5	PNEC. Primary Navy Enlisted Classification Code.
6	SNEC. Secondary Navy Enlisted Classification Code.
7	NEC3. Tertiary Navy Enlisted Classification Code.
8	BRCL. Branch and class of service code.
9	EAOS YRMO. Year and month of expiration of active obligated service.
10	EXT OTH. Extension of enlistment month.
11	EXT SCH. Number of months extension of enlistment for school.
12	PRD YRMO. Year and month of prospective rotation date.
13	EDA/L YRMO. Estimated date (year and month) that the individual will arrive or leave the command. EDA or EDL is indicated by suffix of A or L.

Lower Column Headings

Column	Column Description
1	RATE. Rate and Rating.
2	1500 INST REQT. Total number established as requirement in Ref. 7.
3	ALLOW. Allowance reflected in approved manpower authorization.
4	COB. Current on-board.
5 - 16	POB1 through POB12. Projected on-board one to twelve months from date of report.

c. NEC Exception Report

Line	Line Description
1	Report Title and date.
2	FACSO report symbol, GEMS report number and page number.
3	Activity title and report subtitle.
4	Column headings.
etc.	Listing of NEC's with 75 percent or less attainment

Column	Column Description
1	NEC. NEC with 75 percent or less attainment
2	ALLOWANCE. Total of authorized NEC's reflected in manpower authorizations.
3	COB. Current on-board.
4	DEFICIENCY. Difference between allowance and current on-board.
5	PERCENT ATTAINMENT. Percent of allowance currently on-board.
6 - 10	Same as columns one through five.

PRCP SKILL STRENGTH REPORT — 75 NOV 30

FACSO RPT SYM/NO. 04040/B2080R01 — BUILDER SKILLS — GEMS REPORT NO. 1200-002 PAGE 2

NMCB 1

SKILL LEVEL	STD REQT	MIN REQT	PROJ REQT	COB BASE	COB OTH	POB 3 BASE	POB 3 OTH	POB 6 BASE	POB 6 OTH	POB 9 BASE	POB 9 OTH	POB12 BASE	POB12 OTH	COMPARISON STD TO POB 6 +/-	COMPARISON STD TO POB 6 %	COMPARISON PROJ TO POB 6 +/-	COMPARISON PROJ TO POB 6 %
PLANNING, ESTIMATING & SCHEDULING																	
2	5	3	3			1		2		1		1		3-	40.0		
1	20	12	13			11		10		10		10		10-	50.0		
TOTAL	25	15	16			12		12		11		11		13-	48.0		
SAWFITTING																	
1	4	2	5			5		5		5		4		1	125.0		
TOTAL	4	2	5			5		5		5		4		1	125.0		
WOODWORKING & MILLWORKING																	
2	4	2	2			1		1		1				3-	25.0		
1	35	22	111	5		99	5	94	5	88	5	75	4	59	268.5		
TOTAL	39	24	113	5		100	5	95	5	89	5	75	4	56	243.5		
FORMING & REINFORCING																	
3	7	5	4			3		4		4		3		3-	57.1		
2	32	21	25	1		18	1	16	1	14	1	11	1	16-	50.0		
1	54	36	97	8		91	8	89	9	81	7	69	6	35	164.8		
TOTAL	93	62	126	9		112	9	109	10	99	8	83	7	16	117.2		
MIXING, PLACING & FINISHING CONCRETE																	
3	7	5	4			3		4		4		3		3-	57.1		
2	32	21	36	1		30	1	28	1	25	1	20	1	4-	87.5		
1	54	36	89	8		82	7	78	8	71	7	62	7	24	144.4		
TOTAL	93	62	129	9		115	8	110	9	100	8	85	8	17	118.2		
MASONRY UNIT CONSTRUCTION																	
3	7	5	8			5		3		3		3		4-	42.8		
2	32	21	22	1		17	1	16	1	15	1	12	1	16-	50.0		
1	54	36	90	6		84	5	81	6	73	5	64	4	27	150.0		
TOTAL	93	62	120	7		106	6	100	7	91	6	79	5	7	107.5		

FIGURE 1

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NMCB 1

NAME	SSN	RATE	DISTR RATE	PNEC	SNEC	NEC3	BR CL	EAOS YRMO	EXT OTH	EXT SCH	PRO YRMO	EDA/L YRMO
NEC 5515 ALLOWANCE 7												
[redacted]	[redacted]	BU1		5515	9526	0000	11	8001	00	00	7512	
[redacted]	[redacted]	SW1		5515	0000	0000	11	7702	00	00	7605	
[redacted]	[redacted]	BUC		5515	0000	0000	11	8104	00	00	7601	7602A
[redacted]	[redacted]	BU1		5515	9527	9585	11	7606	00	00	7812	
[redacted]	[redacted]	BUC		5501	9527	5515	11	7601	00	00	7610	
[redacted]	[redacted]	CE1		5515	0000	0000	11	7705	00	00	7611	
[redacted]	[redacted]	CEC		5515	0000	0000	11	7904	00	00	7602	7602L
[redacted]	[redacted]	EAC		5515	0000	0000	11	8111	00	00	7805	
RATING TOTALS	EAC		1	1	1	1	1	1	1	1	1	1
	EA2	1	0	0	0	0	0	0	0	0	0	0
	CEC		1	1	1	0	0	0	0	0	0	0
	CE1	1	1	1	1	1	1	1	1	1	1	0
	BUC	1	1	1	0	0	1	1	1	1	1	1
	BU1	2	2	1	1	1	1	1	0	0	0	0
	SW1	1	1	1	1	1	1	0	0	0	0	0
	UT1	1	0	0	0	0	0	0	0	0	0	0
TOTAL NEC 5515	7	7	7	6	5	4	5	5	4	3	3	3	3	3	2
NEC 5632 ALLOWANCE 3												
[redacted]	[redacted]	CE1		5632	5644	0000	11	7905	00	00	7612	
RATING TOTALS	CE1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	CE2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL NEC 5632	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
NEC 5642 ALLOWANCE 3												
[redacted]	[redacted]	CE1		5642	0000	0000	11	7606	06	00	7811	
RATING TOTALS	CE1		1	1	1	1	1	1	1	1	1	1	1	1	1
	CE2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL NEC 5642		2	1	1	1	1	1	1	1	1	1	1	1	1	1

RATE	1500 INST REQT	ALLOW	COB	POB1	POB2	POB3	POB4	POB5	POB6	POB7	POB8	POB9	POB10	POB11	POB12

FIGURE 2

NEC EXCEPTION REPORT 75 NOV 30

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NMCB 133

75% OR LESS NEC ATTAINMENT

NEC	ALLOWANCE	COB	DEFICIENCY	PERCENT ATTAINMENT
2516	1	0	1	0
2525	1	0	1	0
3122	1	0	1	0
3528	2	0	2	0
3532	2	0	2	0
5632	3	0	3	0
5642	3	1	2	33
5644	3	1	2	33
5709	3	1	2	33
5711	2	0	2	0
5804	2	1	1	50
5901	5	3	2	60
5902	5	3	2	60
5908	2	0	2	0
6012	6	3	3	50
6013	4	0	4	0
6014	4	0	4	0
6017	3	1	2	33
6021	2	0	2	0
6104	3	2	1	66
6117	2	1	1	50
8412	1	0	1	0
8425	3	0	3	0

FIGURE 3

. THE TRAINING FUNCTION

The authority and responsibility for training of Naval ersonnel is set forth in U. S. Navy Regulations, 1973. rticle 0304 assigns to the Chief of Naval Operations the esponsibility to train, equip, prepare and maintain the eadiness of Naval Forces. Article 0318 states that the hief of Naval Education and Training under the command of he Chief of Naval Operations shall be responsible for the raining of Navy personnel, other than training assigned to ther authorities.

Article 0728 charges the Commanding Officer with the esponsibility to : (a) endeavor to increase the specialized nd general professional knowledge of the personnel under is comand by the frequent conduct of drills, and nstructicn, and by the utilization of appropriate fleet and ervice schocls, (b) encourage and provide assistance and acilities tc the personnel under his command who seek to urther their education in professional or other subjects.

Beginning in FY-1973, the amount of training that the epartment of Defense and the component services can provide ill come under Congressional scrutiny with the passage of ublic Law 92-430. This law requires that for each fiscal ear, the Congress shall authorize the average military tudent loads for each component of the armed forces. This uthorization is not required for unit or crew training tudent loads, but does apply to the following individual raining categories: recruit and specialized training, light training, professional training in military and ivilian institutions, and officer acquisition training. ost of the technical training provided for Group VIII

ersonnel through formal schools is defined as specialized raining and falls under these Congressional limitations. eference 8 outlines procedures and responsibilities within he Naval Education and Training Command to comply with ublic Law 92-436.

1. Formal Training

Formal training for enlisted personnel can be ivided into two categories: Enlisted rating training and nctional training. This paper is concerned primarily with he enlisted rating category of formal training, more ommonly referred to as P, A, B or J, and C-School. unctional training provides training to personnel, often in a group or team situation, in the performance of specialized asks or functions which are not normal to rating training f enlisted personnel. Embarkation training conducted by he Naval Amphibious Schools and the Chief Petty Officer CPO) Course conducted by the Civil Engineer Corps Officers chool are examples of functional schools. The Chief of aval Education and Training has delegated to the Naval echnical Training Command (CNTT) the responsibility to oordinate and direct the technical training of Navy nlisted personnel including Group VIII personnel, [Ref. 9]. he training is accomplished by Naval Construction Training enters (NCTC's) located at Gulfport, Mississippi and Port ueneme, California. The two NCTC's are nearly mirror mages of each other in structure, courses, and operation. lass P, A, B, and C-Schools for all Group VIII ratings are aught at the NCTC's. Course listings and convening dates re contained in Ref. 3. A brief description of each of the ormal schools follows:

Class P-Schools are designed to provide training in

asic skills common to all construction ratings. Personnel re provided the basic knowledge necessary for advancement o Constructionman. Because of the nature of the training, ll input is directly from recruit training graduates.

A-Schools are, in general, designed to provide basic echnical knowledge and skills necessary to prepare for the ower petty officer rates. Input can be directly from ecruit training or from Fleet personnel who went directly o the Fleet without having attended A-School. In FY-1976, ll school eligible Group VIII recruits were sent directly o A-School from recruit training centers

B-Schools are designed to provide the advanced echnical knowlege and skills required to advance to the igher petty officer rates. Personnel become eligible for -School when advanced to E-5 provided they have sufficient ime in service remaining on their enlistment. Currently, nput to B-School is estimated based on a percentage of n-board strength of E-6 personnel in each rating. It hould be noted that the designation of these schools as -Schools is being eliminated and they are now to be termed -Schools or C-7 Schools. This paper will retain the old esignation because it is consistent with most of the pplicable instructions and references.

C-Schools train enlisted personnel in a particular kill or technique which, in general, is not peculiar to any ne rating or broad occupational field. Graduates of -Schools are normally assigned a Navy Enlisted lassification Code.

2. Fleet Training

One of the most significant factors affecting the perational readiness of a unit is the training of its ersonnel and their resultant capability to perform in a otentially hostile environment. It is neither expected or esired that all of the training necessary to field a combat eady unit be provided by the formal schools commands. The leets have traditionally provided for the shorter-range raining needs of its units. The type of training included nder the broad definition of Fleet training includes the cllowing:

General Military Training, (GMT), is training in on-technical areas related to Navy crientation and uidance. Continuing GMT is required at the unit level to einforce and motivate personnel toward overall Navy goals nd objectives, [Ref. 10].

Military training for NCF personnel involves weapons raining, training in defensive operations, communications raining, and tactics. Military training is conducted by he homepcrt NCR, and is supported with Fleet funds and ersonnel. Military training objectives are promulgated in COMCBPAC/CCMCBLANT Instruction, [Ref. 7].

Recognizing the need for supervisory and leadership raining for first line supervisors, the Fleet has stablished a Petty Officers Academy at each NMCB homeport o provide formalized instruction in this area. Convening ates and quotas for the academy are coordinated with NMCB otation schedules.

The homeport NCR is the overall coordinator fcr the arious programs included in the general category of the avy Human Gcals Program, [Ref. 11].

Crew training of NMCB personnel in a variety of reas is supported by the homeport NCR. Such training is rranged and conducted by the NMCB as a part of the homeport raining cycle.

Special SEABEE Training Courses, (SCBT), are onducted by the Naval Construction Training Centers using nstructors and training support funds provided by the cmeport NCR. The courses are, in most cases, extracted irectly from formal Class A or B-Schools, covering specific ndividual rating skills defined in PRCP. Quota contrcl and ourse offerings are determined jointly by the homeport NCR nd NCTC. SCBT courses currently offered at NCTC, Port ueneme are listed in Appendix A and Ref. 12.

3. Factory Training

Factory training usually involves the use of epresentatives of a vendor or manufacturer to provide nstructicn cn the operation of a particular piece of quipment or a system. The instruction may take place at he contractcr's plant, at a Navy school, or on a Navy ship r shore station. Factory training for Group VIII personnel s sponscred by the Civil Engineering Support Office, Naval onstruction Battalion Center, Port Hueneme, California in ccordance with Ref. 13.

. THE PEACETIME ROLE OF THE SEABEES

The primary mission of the NCF during peacetime is raining in preparation for future contingency situations, Ref. 1]. It is uniquely true for the NCF, however, that a econdary benefit to be derived from this training is the onstruction of operational facilities in support of other nits in the Fleet.

1. Project Selection Criteria

The construction projects which are undertaken by MCB's while they are deployed are selected by the Fleet ommanders-in-Chief based primarily on the training value of he project. Projects which are highly repetitive, require imited numbers of skills or are not consistent with the ission of NMCB's are not approved unless there are mportant overriding considerations. Prospective projects re reviewed by COMCBPAC and COMCBLANT as part of the review nd approval process. One of the primary purposes of this eview is to select from the list of possible projects those est suited for NMCB accomplishment and which contribute ost to maintaining readiness for contingency operations.

Regardless of the care exercised during the project selection and approval process, the projects selected may ot always exercise all of the skills that the NMCB is equired to maintain in inventory. For example, in peacetime, it is difficult tc find good training prcjects hat utilize waterfront construction and advanced base onstruction skills because these types of facilites are ypically nct expanded except during wartime. Proficiency

in these types of projects is, however, essential tc the mission of the NMCB, and must be periodically reinforced.

Projects such as the construction of facilities at Diego Garcia in the Indian Ocean are well suited tc NMCB readiness training because of the wide range of skills that are required for such programs. It is an unfortunate fact that during any one deployment, the number of skills that are required for the assigned project workload are, in all probability, specialized and that many individuals will not receive occupational on-the-job (OJT) training in areas they need for advancement and for contingency operations.

Because of the nature of construction, each phase of the project must follow in logical sequence. The type of practical OJT that an individual gets depends of the type of projects and the stage of construction of the project at the time. OJT training on deployment projects cannot provide all of the training in all of the skill areas that are specified fcr contingency operations. It is essential that a solid background in contingency type training be maintained at the homeport NCR and the homeport NCTC.

When the NCF undertakes a construction project there is nearly always the requirement that the unit complete the project within a reasonable time limit barring contingency redeployments or emergencies, and within the budgeted amount. The NMCB is placed in a position of balancing training against production efficiency.

2. Skill Demands of Projects

NMCB's are usually aware of the projects that they will be assigned before they begin the homeport cycle. With the knowlege of the skills that will be needed to

uccessfully execute the projects and using the PRCP skill nventory management system, the unit is able to plan and chedule the specific training necessary for deplcyment rcject execution and individual advancement.

III. ANALYSIS

. ENVIRONMENTAL CONSIDERATIONS

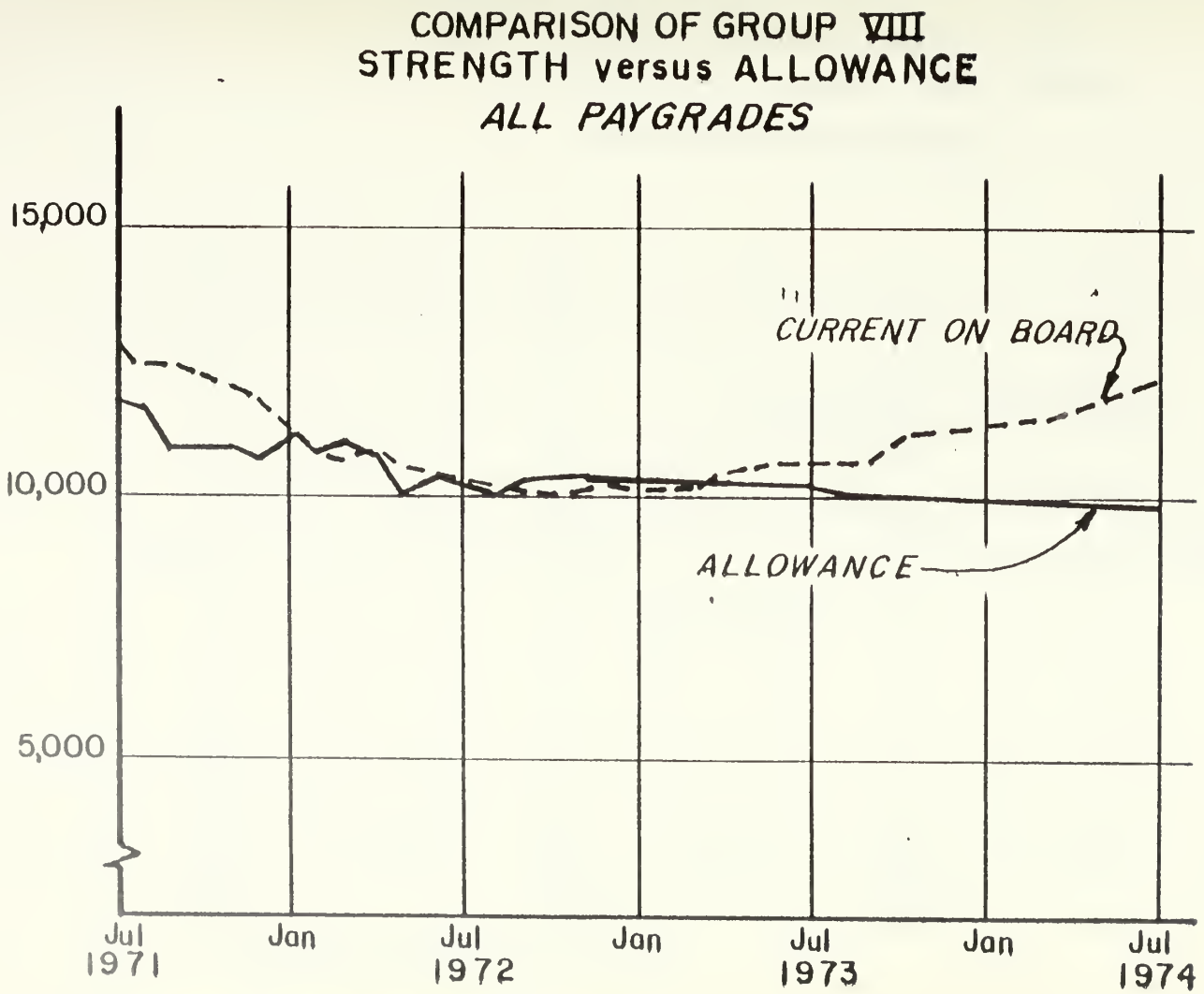
The training plans and programs of the Group VIII ommunity are influenced and constrained by important trends nd factors beyond the control of OP-099 and the Fleets. he nature and direction of funding trends, the effect of ost-Vietnam drawdown on the composition and size of the CF, the changing role of the Naval Reserve, the All olunteer Force, and the economic conditions in private ndustry all impact on the training programs for SEABEES. hese environmental constraints effect the entire Department f Defense budget and are forcing improved management with ewer resources. In 1975 [Ref. 17], then Secretary of efense James R. Schlesinger reported to Congress that the conomic conditions of the country, the tight constraints on he defense budget, and the related size of forces has aused DOD to scrutinize with particular care the way in hich military manpower resources are being used.

1. Manning Levels

The past decade has seen considerable change in the ize and configuration of the NCF. SEABEE strength more han tripled in a four year period from 9,891 in FY65 to 9,813 in FY75, and the authorized FY75 allowance is 9,357. he NCF increased in number from 10 to 22 NMCB's during the eight of the Vietnam War, and then dropped to the nine

attalions currently authorized. One additional NMCB will e lost in FY76. Otherwise, future manning levels and nventory of organized units are expected to stabilize at pproximately the current levels. Management actions equired to accommodate the last five years of declining trength as well as uncontrollable factors such as budget eductions, changing enlistment and reenlistment ropensities, and large changes in the size of the NCF have esulted in a NCF that is not particularly well distributed y skill and by experience level (length of service). The CF has experienced large shortages in E-5 and E-6 pay rades and ccmpensating excesses in personnel of pay grade -4 and below. Figures 4 through 7 show the strength versus llcwance conditions for 1971 through 1974.

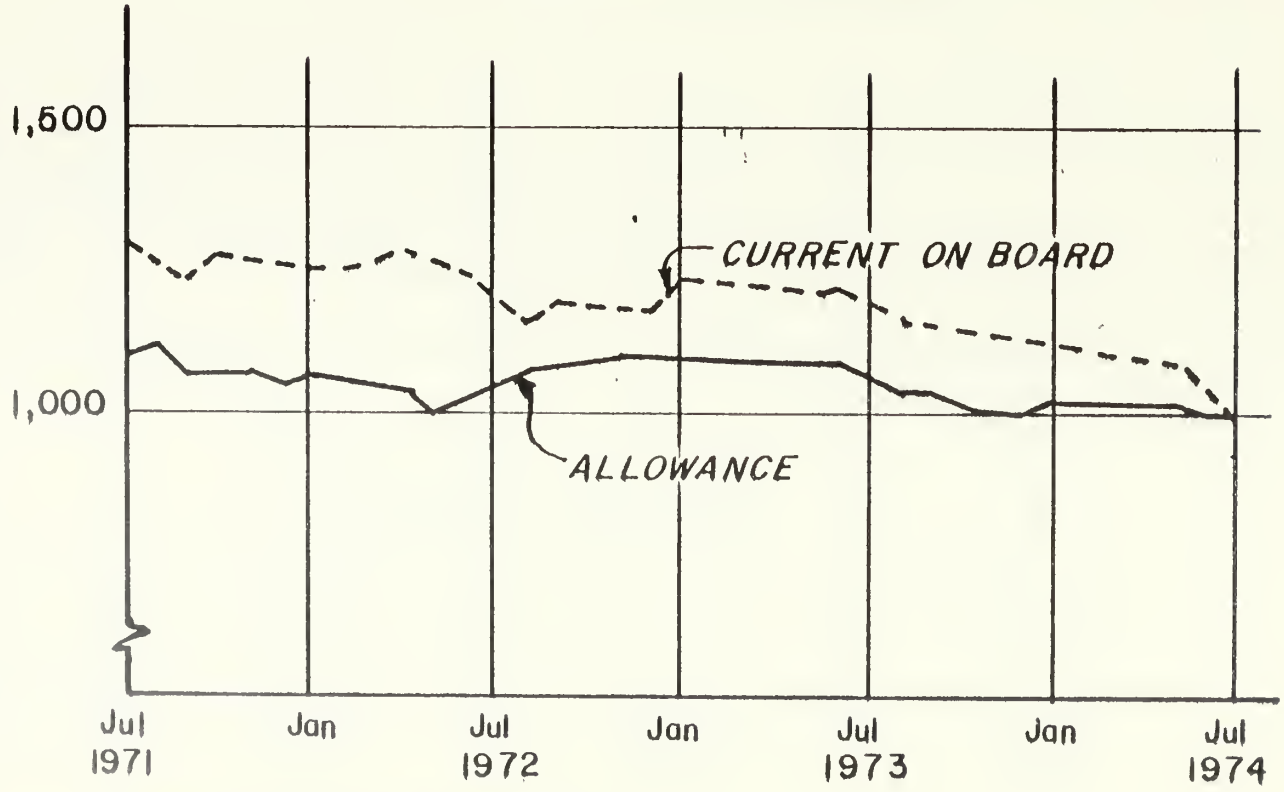
FIGURE 4



Source: Reference 24, p. 18.

FIGURE 5

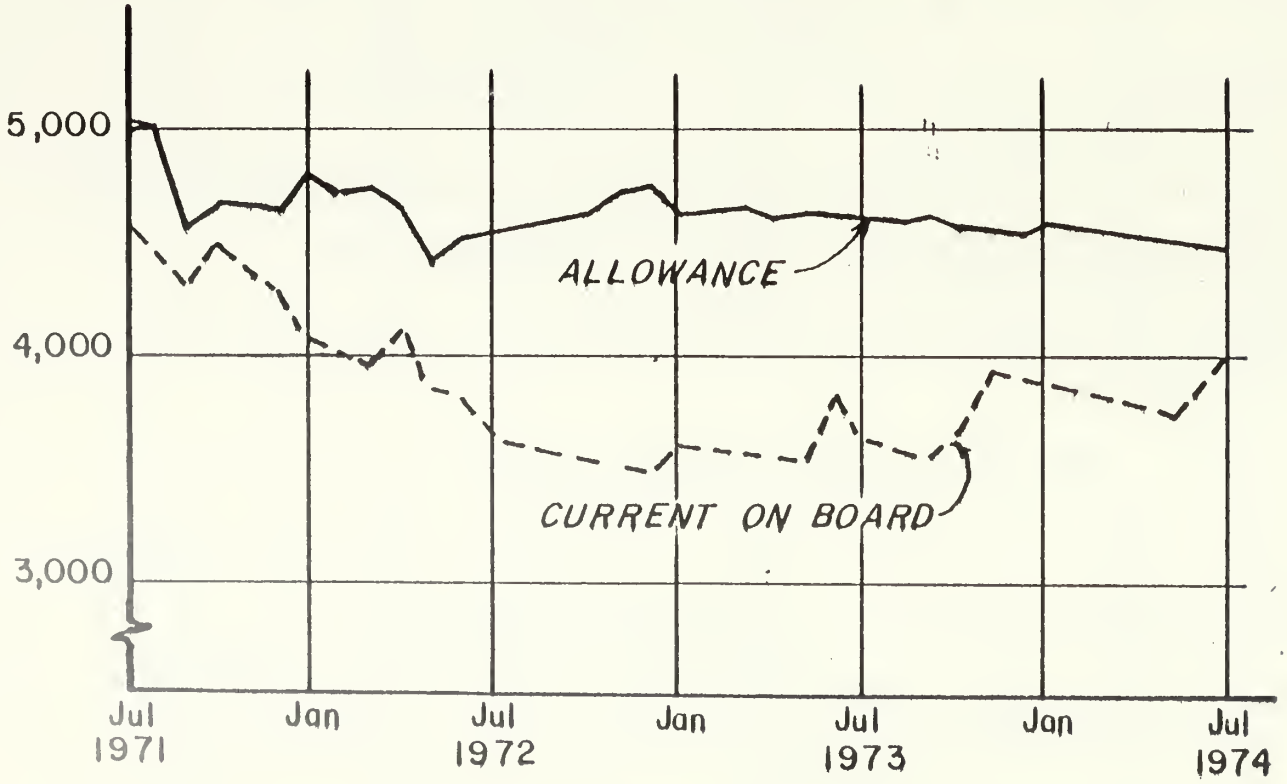
COMPARISON OF GROUP VIII
STRENGTH versus ALLOWANCE
E-7 - E-8 PERSONNEL



Source: Reference 24, p.15.

FIGURE 6

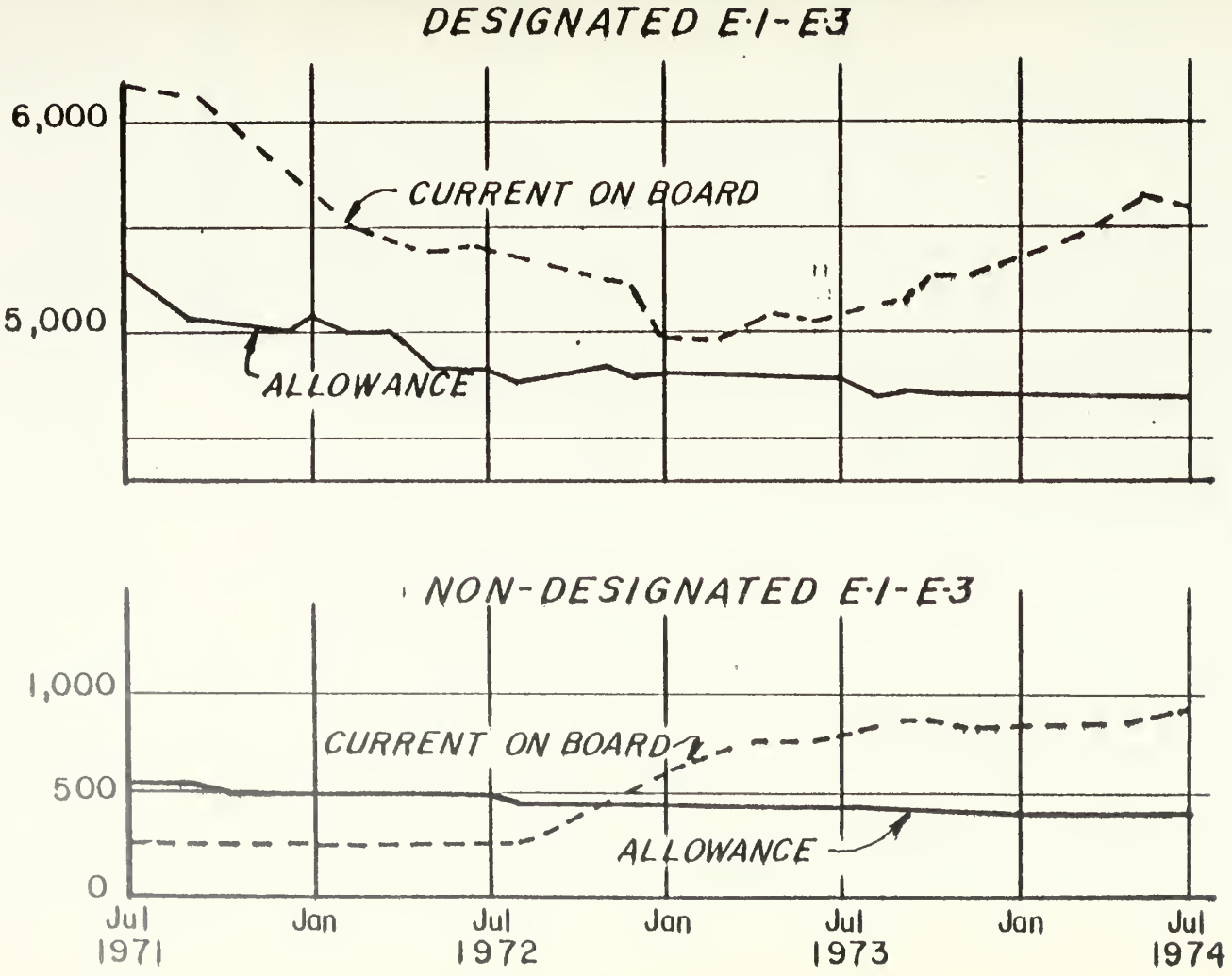
COMPARISON OF GROUP VIII
STRENGTH versus ALLOWANCE
E-5 - E-6 PERSONNEL



Source: Reference 24, p.16.

FIGURE 7

COMPARISON OF GROUP VIII
STRENGTH versus ALLOWANCE



Source: Reference 24, p. 17.

2. The All-Volunteer Force

The termination of the draft and the initiation of programs for achieving the All-Volunteer Force have had significant impact on the Group VIII ratings and the NCF. The Navy must now compete with industry and other military services for manpower. Emphasis is being given to the Navy Human Goals Program, to increased training opportunities, to better pay, to better living conditions, and to improved advancement opportunities. From all indications, the All-Volunteer Force is a success as adequate volunteers are available to maintain manning levels. Also, SEABEE first term reenlistment rates have increased from the 5-year average of 7% during fiscal years 1968 through 1972 to 50% in FY74 and 38% in FY75 [Ref. 21]. During this same period, however, male unemployment in the U.S. increased from 2.9% of the civilian labor force in 1968 to 8.3% in April 1975 [Ref. 15]. Also, U.S. spending for construction decreased from approximately $135 Billion seasonally adjusted rate in December 1972 to a low of $120 Billion in May 1975 [Ref. 6]. By February 1976, construction spending recovered to approximately $140 billion. With increased opportunity for construction workers in the civilian industry, the Navy and the SEABEE community will be hard pressed to maintain favorable retention rates and recruitment levels.

3. The Total-Force Concept

In the annual Defense Department report to Congress on the FY76 and FY7T Defense Budgets [Ref. 17], Secretary Schlesinger stated that DOD is placing more reliance on the Reserve Forces to get greater combat strength for the defense dollar. As a result, a realigned Reserves policy is

merging. Initiatives are now underway to expand Reserve issions, to increase material readiness, and in general, ink the Navy Reserve directly into combat missions which re consistent with national security strategy. A Total orce study under sponsorship of the Secretary of Defense, s now being concluded which considers the availability, orce mix, limitations and potential of reserve components. he broad goals of the study group were to identify unctions and missions which could be converted tc more seful functions, and places where modification tc the eserves are warranted to improve readiness and capability pon mobilization. Associated with the Total-Force Concept, he Reserve Naval Construction Force has been programmed for eduction frcm 17 to eight Battalions in FY77 [Ref. 20]. he smaller Reserve NCF, however, is expected to be brought o higher levels of readiness.

. COST CONSIDERATIONS

Historically, the long existence of the draft and low ay scales for E-1 to E-3 personnel has led to a general ttitude among military leaders that the services of these ersonnel were not a significant cost factor. The major mphasis for cost savings has traditionally been in the quipment or supplies area, since personnel in the lower pay ates were provided in relatively large numbers at low cost. s a result of pay raises since 1971 resulting from the nitiation of the All-Volunteer Force, non-rated men can no cnger be considered inexpensive or free goods. The roughly 33 percent increase in regular military compensation across he first three pay grades has raised the pay of an E-3 with ependents to the equivalent of a semiskilled production orker. In January, 1972, his regular military compensation n the basis of a 40-hour week was about $2.86 per hour. By ctober 1975, it increased to $3.37 per hour.

In 1971, Weiner and Horowitz [Ref. 18] compared the cost f training an A-School graduate to the cost of training a an who did not attend A-School to an equivalent skill evel. The problem was approached by asking the opinions of ver 1900 senior enlisted men about the training progress of -School graduates versus those who did not attend school. rom their opinions, embodied in the responses to a arefully designed questionnaire, it was possible to scertain their estimates of the cost of the on-the-job raining. The study considered trainee salaries and benefits as a training cost, but the value of productive contribution of trainees undergoing on-the-job training was deducted from the cost of such training. The study points out that one of the important costs of training a man

n-the-job is the work must be foregone by the men who are raining him. Thus, if an E-3 takes more senior men in his ork area away from their normal work to teach him a skill, e is costing the Navy the value of that undone work by both en.

The A-School study concluded that requisite skill levels or all ratings can be achieved through experience on the ob, but A-School graduates take less time to become roficient than the nongraduates. It was further concluded hat A-School graduates are more productive during the n-the-job training period and if total costs are onsidered, formal schools appear more efficient for irtually all ratings. These results can be extended to ther occupational training such as B-School, C-School, and CBT courses.

The preferred training sequence, particularly for onstruction skills is formal classroom instruction followed y practical application of the instruction on the job. In his situation, the individual receives the basic knowledge ecessary, the safety training related to the skill, and is enerally trained in the correct way to do the job. These asic skills can be refined under the general direction and supervision of more senior personnel on the job. Learning s increased at a much more rapid rate. Conversely, much of he value of formal training is lost when an individual is xposed to basic skill training in the classroom, but has no pportunity to utilize and develop proficiency in the skills uring deployment.

Each of the Group VIII ratings utilize skills found in several civilian occupational specialties. For example, the Builder rating includes skills encompassing the occupations of brick mason, tile setter, stone mason, rough carpenter, finish carpenter, millwright, cabinetmaker, and so forth.

n the civilian construction industry, it is common to hire ourneyman labor in any one of these occupational areas when he need arises, and to release them when the specific work s accomplished. The SEABEE Builder is, conversely, xpected to be proficient in all of these occupational areas ecause, unlike the civilian construction industry, the work orce of the NMCB is rigidly fixed.

In the past, the utilization of formal schools by eserve Group VIII personnel has been limited. The formal chools are usually several weeks in length, and Reserve ersonnel are on active duty for only a two week period each ear. Also most of the SEABEE Reservists are employed in he construction industry, or in a related occupation, and re journeyman craftsmen in the civilian jobs. Advanced raining in all aspects of their rating would be redundant n many skill areas, but very necessary in others. As a esult, SCBT courses which are one to two weeks in length ave dominated the Seabee Reserve individual training rogram.

C. TRAINING EFFICIENCY

In January 1975, CNET faced a funding decrease totalling $75 million in FY 1977. Included in CNET's proposal to reduce its expenditures was an item to disestablish the Group VIII formal B-Schools at Port Hueneme and Gulfport. CNET indicated that this action would eliminate 193 billets, (173 students and 20 instructors) and save an estimated $1.8 million [Ref. 22]. This step would tend to transfer a training problem to others, presumably the Fleets, and before such a step is taken, other possible areas of economy should be investigated. Two areas which show promise are the one station training concept, and the implementing of a validation procedure for formal courses of instruction.

1. One Station Training

On a DOD-wide basis, the average recruit spends about five months of the first tour in achieving his initial skill and travelling to his first assignment. In FY 1975, less than five percent of the personnel completing basic training went directly to a unit. The other 95% went on to advanced training centers or to one of the technical service schools. To improve the quality of training and reduce the travel and waiting time, the Army is undertaking a new training concept called One Station Training [Ref. 17]. This is a system of initial entry training management for all enlisted personnel which minimizes the turbulance during training of new enlistees and economizes on the structure of the training base. These goals are achieved by conducting all stages of initial entry training for most enlistees at a single training base. The program calls for designation of

an individual's initial entry training program immediately upon his enlistment at the Armed Forces Entrance and Examination Center, and will result in a predetermined flow for the individual through training, usually at a single installation, to his first unit.

The one station concept appears to have considerable merit for the Group VIII ratings. At present, enlistees receive basic training at one of the three recruit training centers at Great Lakes, San Diego, or Orlando. Upon completion of basic training, the individual travels to a NCTC for occupational training in A-School. There is usually some waiting time at the NCTC since A-School convening dates are not necessarily coordinated with recruit graduation dates. After completion of A-School, the individual joins his first unit. If the individual is assigned to an NMCB which is deployed, a decision has to be made whether to have the man join the Battalion or to hold him at homeport to await the return of the unit. Another aspect of the scheduling problem is that when held in homeport, the individual can be a liability rather than an asset, since management personnel must be available to supervise him.

The one station concept whereby SEABEE recruit training is conducted at a NCTC could reduce or eliminate the travel and waiting time for new enlistees by making sequence scheduling possible. This concept would also permit the tailoring of the recruit training program to delete those portions which relate entirely to the shipboard Navy and concentrate on those which relate to the SEABEES. For example, shipboard damage control training provides little utility to the SEABEE, yet defensive military training is absolutely necessary.

The major factor which might preclude the one

station concept is the adequacy of the facilities at the CBC's to accommodate the increased student load. The recruit input into the construction ratings is expected to average less than 2000 men per year for the forseeable future. This equates to about 230 average recruit base loading increase per CBC. Considering the expected decrease in personnel awaiting transfer to their unit, this increased base loading could be considerably reduced.

2. Duplication of Training

Most of the individual rating skills required by the Fleets for the standard NMCB can be obtained through formal schools or through SCBT courses. Since most of the SCBT courses come directly from the formal schools curriculum [Ref. 12] personnel have probably been exposed to some of the training provided at the formal schools at a previous time. There is some benefit to be derived from a refresher in the course area, but if training resources are as severely constrained as appears to be the case, it is possible that better use of the time could be made. If careful records of SCBT courses attended were maintained, and included in the PRCP system, and a validation procedure initiated which would eliminate the re-exposure to course material, the length of the formal schools, and hence their cost might well be reduced.

D. SYSTEM CONSIDERATIONS

Anthony, Deardon, and Vancil [Ref. 19] point out in their discussion of the requirements of management control systems, that it should be a coordinated, integrated system; that is, although data collected for one purpose may differ from those collected for another purpose, these data should be reconcilable with one another. In a sense, the management control system should be a single system, but it is perhaps more accurate to think of it as a set of interlocking subsystems. The purpose of any management control system should be to encourage managers to take actions that are in the best interest of the entity. Technically, this purpose can be described as "goal congruence".

The management control systems controlling Group VIII training appear to lack this vital element of goal congruence. The active and reserve Naval Construction Force have each established training objectives in terms of specific skills which are defined in the PRCP. Annually, BUPERS and CNO (OP-099) establish formal training objectives, not on the basis of PRCP, but on other factors. A-School and P-School plans are closely linked to accession programs, and C-School requirements are determined based on a comparison of NEC requirements versus assets. B-School requirements are based on a percentage of on-board E-6's in each rating. With the exception of C-School, which can be correlated with PRCP skills, COMCBPAC, COMCBLANT, and COMFIRSTRESNAVCONSTBRIGADE have not established quantitative requirements for the formal schools. Management information reports associated with the PRCP encourage NMCB's to structure their training plans to correct PRCP deficiencies

and since A-School and B-School provide training in "packages" of skills, it is easier for NMCB's to correct PRCP deficiencies with SCBT courses. In most cases, there is no incentive for the NMCB to send critically needed personnel to A or B-School, and the unit is actually penalized because the travel and per diem costs affect the unit's operating budget. These shortcomings in the current system create a tendency to rely on the training courses available during the homeport training cycle for correction of deficiencies. As a consequence, SCBT courses, which directly correlate to PRCP deficiencies have become the most demanded form of Group VIII training.

COMCBPAC, COMCBLANT, and COMFIRSTRESNAVCONSTBRIGADE are committed to the PRCP for skill management and control. It would be desirable if the formal schools training program could be managed using the same system to generate requirements data. The COMCBPAC/COMCBLANT joint training and skill requirements are reviewed and updated on an annual basis at a conference workshop of various representatives having expertise in the general areas of skill requirement definition, training execution, training management, and manpower management. The annual training conferences are relatively recent developments. The most recent conference was held in June 1975.

1. Formal Schools Training System

Training requirements are determined by the CNO (OP-099), generally utilizing the recommendations provided by CHNAVPERS (Pers-2). Aside from A and P-Schools, which are closely identified with accession programs, B and C-Schools constitute the bulk of the formal training program. School quotas are approved after resource allocation to the various schools and training activities is

made.

a. P-School Planning

Group VIII personnel recruited with a 3-year obligation under the SEAFARER program are guaranteed 4 weeks of P-School apprentice training before assignment tc the Fleet. This program was terminated for SEABEES in 1975, however, 1708 recruits attended P-School in fiscal years 1973 and 1974.

b. A-School Planning

A-School quota planning is tied directly to the personnel acquisition or accession programs. Personnel recruited under the School Guarantee Program and the Occupational Specialty School Guarantee Program are guaranteed A-School training. Input into A-School in FY 1974 and FY 1975 was 2,326 and 3,157, respectively. Utilization was 101% and 105% of planned quotas. Table IV provides a breakdown of A-Schools utilization by rating for FY 1974.

TABLE IV

GROUP VIII A-SCHOOLS

QUOTAS vs UTILIZATION FY 1974

Rating	Quota	Recruit Input	Fleet Input	Total Input	Percent Utilized
EA	85	57	42	99	117
BU	648	522	163	685	106
SW	167	130	46	176	105
UT	357	291	67	358	100
CE	339	268	71	339	100
EO	461	351	48	399	88
CM	254	237	33	270	106
Total	2311	1856	470	2326	101

Source: Reference 24, page 77.

c. E-School Planning

The average annual input for E-Schools was 345 for FY 1974 and FY 1975. In FY 1976, the planned input is 340. The students are administered and instructed by a staff of approximately 20 Navy personnel. Costs to operate these schools average $635 per student or $220,000 per year. Utilization of the E-Schools has been very high since 1974 and 105% of the quotas available have been taken. The present method used by BUPERS to determine E-School requirements calls for training 20 percent of the current on-board strength of E-6 personnel in each rating. This formula assumes that sufficient quotas will be provided under an ideal force structure to insure all eligible personnel being sent through E-School at the 10-12 year point in his career. Table V displays the 31 January 1975 Navy-wide inventory of E-School graduates compared with the total Navy personnel allowance in each rating. From a review of these data, it appears that an equitable distribution of resources to the different ratings is not being achieved (A proposed model to help more equitably distribute the school quotas is discussed in later sections of this paper). The reason for this situation is that the various ratings have different accession, advancement, and retention rates.

Another concern associated with E-Schools is that COMCBPAC, COMCBLANT, and COMFIRSTRESNAVCONSTBRIGADE have not stated a E-School requirement which can be quantified. There is general agreement that the E-Schools are desirable and should be continued, however active and reserve requirements are expressed in terms of PRCP skills. Skill inventory management and training performance evaluation is done in terms of PRCP skills, not formal

schools utilization, and the Fleet's case for continuance of E-Schools is weakened because there is no apparent requirement for this school. A proposed method of determining E-School requirements based on PRCP skill deficiencies will be discussed later in this paper.

TABLE V

B-SCHOOL GRADUATES BY RATING, E-5 - E-6 PERSONNEL

As of 31 July 1975

E-5 PERSONNEL

Rating	Allowance	On-board	% of Allowance	% of On-board
EA	85	123	7	5
CE	395	406	16	15
EO	434	504	44	38
CM	349	377	26	24
BU	593	573	15	15
SW	157	157	20	20
UT	338	315	19	20

E-6 PERSONNEL

Rating	Allowance	On-board	% of Allowance	% of On-board
EA	69	74	32	30
CE	250	245	34	34
EO	377	360	46	48
CM	279	266	36	38
BU	440	431	41	42
SW	169	169	31	31
UT	229	217	37	39

Source: Civil Engineering Support Office, Naval Construction Battalion Center, Port Hueneme, California letter to Naval Facilities Engineering Command, Subject: B-School graduates versus stated requirements, dated 22 September, 1975.

d. C-School Planning

Since C-School requirements are based on an inventory management model that considers the current inventory of NEC's and planned gains and losses, a reasonably accurate requirement for these schools can be generated. Input into the C-Schools in FY 1974 was 506. In FY 1975, the planned input was increased to 838. Table VI reflects the FY 1974 utilization.

TABLE VI

UTILIZATION OF GROUP VIII C-SCHOOLS

Fiscal Year 1974

NEC	School	Quota	In-put	Percent Utilized
5515	Planner and Estimator	44	47	106
5644	Cable Splicing Technician	15	16	107
5707	Water Well Drilling Technician	0	11	-
5708	Blaster	0	18	-
5709	Crushing/Screening Plant Tech.	11	14	127
5711	Grade Foreman	19	22	115
5712	Asphalt Paving/Plant Op Tech.	12	36	216
5801	Auto Trans and Hyd. Mechanic	19	23	121
5802	Automotive Electrical Technician	20	24	120
	Shop Stores Procedures	48	47	97
5901	Builder (Concrete)	23	38	165
5902	Masonry Tech.	40	45	112
5904	Millworker	23	28	121
5906	Heavy Construction Tech.	59	52	88
5908	Tool and Equipment Tech.	22	23	104
6017	Sheetmetal Tech.	42	32	76
6021	Safety Inspector	0	0	-
	Welder Certification	50	48	96
6102	Shorebased Boiler Controls Tech.	26	22	84
	Totals	423	506	120

Source: Reference 24, page 77.

2. Coordination of PRCP and Formal Training

a. E-School Requirements based on PRCP

Most of the individual rating skills listed in PRCP may be acquired through completion of formal CNET schools. The applicable formal schools that lead to the PRCP skills are listed in Ref. 7. With this correlation of formal schools and PRCP, it should be possible to equate formal schools training requirements to PRCP skill deficiencies. For the Builder rating, for example, the following skills are obtainable through Builder B-School [Ref. 7, p.22]:

SKILL TITLE	NO.	LEVEL
Planning and Estimating	103	1
Woodworking and Millworking	110	1
Concrete Forming and Reinforcing	130	2
Mixing, Placing, and Finishing Conc.	132	2
Masonry Unit Construction	140	2
Light Frame Construction	150	2
Finish Carpentry	164	2
Plastering	166	1
Heavy Construction	170	2

In Table VII, the current on-board inventory on 30 November 1975 for the Builder rating is compared with the standard NMCB requirement. These data show that on the average, the NMCB inventory of these skills is above the standard requirement in all skills except 170/2, Heavy Construction, Level 2. In this skill, all NMCB's are below

standard. Assuming that the PRCP skill inventory accurately represents the actual conditions, there is apparently little or no requirement for Builder B-School. The skill deficiencies can be corrected more economically with SCBT courses. Tables VIII and IX provide a similar analysis for the Construction Electrician rating. Table VIII lists the skills that are obtainable through Construction Electrician B-School and Table IX lists the current inventory of the skill in each battalion. The standard NMCB requirement is also shown for comparison purposes. The most severe deficiency exists in NMCB 10 where there is a shortage of six in skill 212/2 and three in skill 220/2. These data would appear to demonstrate that, while skill deficiencies exist in all ratings, personnel are not deficient in all of the skill areas encountered at B-School, and shorter courses aimed at specific deficiencies may better serve to reduce skill shortages than attendance at a full term at B-School.

Personnel entering B-School following a normal tour of shore duty will not have had the opportunity to complete SCBT courses and will likely require the entire B-School curriculum. Also, B-Schools for some of the Group VIII ratings are given college credit by some Colleges, Universities, and Trade Schools. The B-School certificate of completion therefore has considerable value to the individual beyond Navy career considerations. For these reasons, B-School should not be disestablished. As will be discussed, however, a validation procedure for those portions of B-School completed before actual entry to the school does appear warranted.

TABLE VII

BUILDER SKILLS

COMPARISON OF SKILL ASSETS VERSUS REQUIREMENTS

FOR PRCP SKILLS OBTAINABLE AT B-SCHOOL

(By Naval Mobile Construction Battalion)

Skill No.	103	110	130	132	140	150	164	166	170
Skill Level	1	1	2	2	2	2	2	1	2
NMCB Std Reqt	17	30	28	28	28	26	12	31	27
NMCB 1	13	112	25	36	22	28	25	90	20
NMCB 3	11	91	20	25	27	30	30	49	19
NMCB 4	22	105	38	37	37	50	54	71	20
NMCB 5	31	116	29	33	28	32	27	64	13
NMCB 10	37	107	42	65	48	47	41	59	17
NMCB 40	10	99	23	38	20	32	31	48	12
NMCB 62	21	104	35	33	35	30	23	56	19
NMCB 74	31	96	25	35	30	33	39	51	12
NMCB 133	25	101	29	44	21	32	25	50	9
Average	22	103	30	38	30	35	33	60	16

Source: PRCP Skill Strength Report, GEMS Report No. 1200-002 dated 30 November 1975.

TABLE VIII

CONSTRUCTION ELECTRICIAN

PRCP SKILLS OBTAINABLE THROUGH B-SCHOOL

Skill No.	Skill Level	Skill Title
203	1	Planning and estimating
212	2	Shore based power plant technician
216	2	Electric motors and controls
220	2	Electric power and telephone dist. sys.
231	1	Telephone exchange systems
234	1	Inter-office and public address systems
237	1	Cable splicing
240	2	Interior wiring
250	1	Motor and generator rewinding

Source: PRCP Skill Strength Report, GEMS Report No. 1200-002 dated 30 November 1975.

TABLE IX

CONSTRUCTION ELECTRICIAN SKILLS

COMPARISON OF SKILL ASSETS VERSUS REQUIREMENTS

FOR PRCP SKILLS OBTAINABLE AT B-SCHOOL

(By Naval Mobile Construction Battalion)

Skill No.	203	212	216	220	231	234	237	240	250
Skill Level	1	2	2	2	1	1	1	2	1
NMCB Std Reqt	5	8	8	8	8	4	8	5	4
NMCB 1	9	11	28	7	25	18	33	20	16
NMCB 3	11	10	23	7	26	13	26	8	13
NMCB 4	3	9	16	8	22	21	25	9	20
NMCB 5	8	6	6	6	22	21	25	9	16
NMCB 10	12	2	9	5	12	9	21	11	9
NMCB 40	5	9	12	7	13	11	23	19	14
NMCB 62	9	8	9	9	19	17	26	19	15
NMCB 74	9	14	14	13	20	22	40	15	10
NMCB 133	13	10	8	6	11	15	22	12	11

Source: PRCP Skill Strength Report, GEMS Report No. 1200-002 dated 30 November 1975.

b. C-School Requirements based on PRCP

OP-099 determines C-School quotas based on a comparison of projected NEC requirements with the projected NEC inventory. NEC requirements are those listed on approved manpower authorizations. Some NEC requirements listed in the NCF skill requirements directive are not reflected in the CNO approved Manpower Authorizations (OPNAV 1000/2) and are therefore not recognized by CNO (OP-099) and CHNAVPERS as requirements in the C-School process. Table X shows the minimum and target requirements for each NEC according to COMCBPAC/COMCBLANT INST 1500.20. These are compared with the manpower authorization for a standard NMCB to underscore the differences. The Fleet minimum requirement differs from the manpower authorization in 11 of 27 cases. In only one case is the target requirement the same as the manpower authorization. The manpower authorizations should be updated to reflect Fleet requirements, since until this step is is taken, the C-School requirement will not be accurately known.

NEC deficiencies are correlated with PRCP deficiencies, however, Ref. 7 specifies training and skill requirements in terms of (1) An absolute minimum number, (2) A target expressed as a percent of on-board strength, and (3) A target expressed as a percent of a standard NMCB allowance. This duplicity may lead to erroneous conclusions as to the actual requirements, particularly by those faced with skill or resource deficiencies. There may be questions as to whether resources should be programmed based on the minimum or target requirements, and that clarification of the training requirement is needed. Elimination of the "target" terminology should make skill requirement quantification and justification much less confusing.

TABLE X

NAVAL MOBILE CONSTRUCTION BATTALION

NEC REQUIREMENTS

NEC Code	Descriptive Title	Fleet Min	Fleet Tgt	Man-Pwr Auth
5501	Construction Inspector	5	12	0
5502	Soils Pavement Analyst	2	3	2
5515	Construction Planner and Estimator	7	14	7
5632	Shcre Eased Power Plant Tech.	3	4	3
5642	Central Office Exchange Tech.	2	2	3
5644	Cable Splicing Tech.	3	4	3
5707	Water Well Drilling Tech.	3	5	3
5708	Blaster	5	7	5
5709	Crushirg and Screening Plant Tech.	3	5	3
5711	Grade Fcreman	4	6	2
5712	Asphalt Plant and Paving Tech.	4	4	6
5801	Auto Transmission/Hydraulics Mech.	6	8	6
5802	Masonry Tech.	2	3	2
5804	Stationary Diesel Engine Mech.	2	3	0
5901	Concrete Tech.	5	7	5
5902	Masonry Tech.	5	7	5
5904	Millworker	2	3	2
5906	Heavy Ccnst Tech.	7	10	8
5908	Tocl and Equipment Tech.	2	4	2
6012	Maintenance Welder	2	5	6
6013	Certified Structural Welder	0	0	4
6014	Certified Pipe Welder	0	0	4
6017	Sheetmetal Tech.	2	3	3
6021	Safety Inspector	1	2	3
6102	Shore Eased Boiler Controls Tech.	3	4	3
6014	Refrig. and Air Conditioning Tech.	3	4	3
6117	Petrcleum Tank Farm Tech.	2	3	2

Source: Reference 7 and Chief of Naval Operations Manpower Authorization, OPNAV 1000/2, for NMCB 1 dated 22 October 1975

c. Scope of Implementation of PRCP

PRCP is presently implemented throughout the active NCF, the Reserve NCF, and is being extended to include thr CBU's and CBMU 302. In order to serve as the base for all training and skill management, it shcuild be extended to include all Group VIII personnel and billets.

d. Funding Considerations

It has been demonstrated in the previous paragraphs that PRCP has utility as a skill inventory and requirements indicator. Adoption of SCBT courses as elements cf formal schools is a logical next step in the training system, but some means must be determined tc allocate funding responsibility between the participants. An allocaticn based on the purpose of the training appears most satisfactory. The following breakdown of funding responsibility is recommended:

Purpose of Training	Funding Responsibility
Skill Acquisition	CNET
Refresher Training	Fleets
Cross Rating Training	Fleets
Reserves Training	Reserves

The annual requirement for skill acquisition training can be determined based on the projected accession and promotion rates. Personnel accession plans would continue to determine the requirement for A-School and funding would be a CNET responsibility. Advanced specialized training (B-School) requirements can be determined based on projected

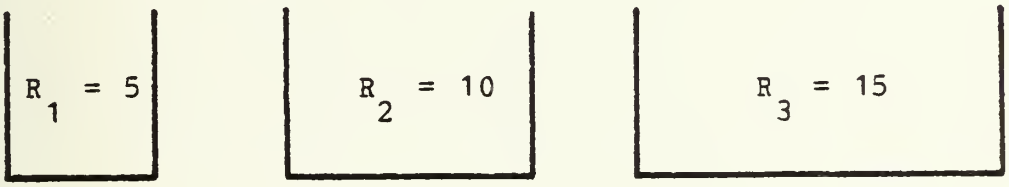
numbers to be promoted to E-5. All of these personnel should be programmed through training as early as possible in order to amortize the cost of the training over as long a period as possible. C-Schools should continue to be programmed on the basis of the current inventory planning model or be based on PRCP once PRCP is expanded to include all Group VIII personnel and billets. C-School training for approved NEC's is a CNET responsibility. All additional training for the active NCF which is desired for deployment requirements, for cross-rate training, or for special purposes beyond approved levels would become a Fleet responsibility. All training for the Reserves should continue to be funded by the Chief of Naval Reserve. The annual training conference is the logical arena to resolve differences concerning the annual training program and to establish a firm plan.

E. THE TRAINING REQUIREMENTS MODEL

One of the assumptions which is basic the process of managing the training program of the NCF is that maximum use will be made of the training resources available. One possible area of improvement is the method in which training billets are allocated. The various means used to allocate school billets have previously been discussed. Briefly the allocation is made on rules of thumb based on on-board levels in certain ratings, on anticipated input levels, or on NEC shortages. Fleet schools, particularly SCBT courses, tend to be scheduled based on PRCP deficiencies or individual circumstances of NMCB's returning to homeport. All of these allocation methods are satisfactory if there are sufficient training resources to meet all of the deficiencies. If, however, decisions must be made to allocate resources between competing objectives, some procedure must be developed to take care of the most pressing needs first. In order to simplify the presentation of the model proposed to serve this purpose, a procedure for allocating the B-School billets between the Group VIII Ratings will be presented. The procedure is applicable to other situations involving allocation of billets of any of the formal or Fleet schools between ratings, individuals, or commands.

1. A Simple Distribution Problem

Consider the problem represented below with three containers of unequal size. The volumes represented are: $R_1 = 5$, $R_2 = 10$, $R_3 = 15$. It is desired to distribute 12 units to the three containers so that each receives a proportionate share.



The total capacity of all three containers is $R_1 + R_2 + R_3 = 30$. The 12 added units should be distributed between the containers as follows:

Container	Proportionate Share
1	5/30 x 12 = 2
2	10/30 x 12 = 4
3	15/30 x 12 = 6

Now suppose that the containers are initially partially filled, and it is desired to add the 12 units to the three containers such that all will end up equally full. If the containers initially contain material, that is, if there is a beginning inventory (BI) of: $BI_1 = 1$, $BI_2 = 4$ and $BI_3 = 3$, and 12 is to be added to the inventory, the

inventory will total 20. The distribution between containers is as follows:

Vol	Share	B.I.	Amt to Add
1	5/30 x 20 = 3.33	-1	2.33
2	10/30 x 20 = 6.67	-4	2.67
3	15/30 x 20 = 10.00	-3	7.00

2. A General Model

The problem of distributing training quotas to seven SEABEE ratings of equal importance but of different sizes is very similar to the simple distribution problem just presented. In the B-School problem, the planner is trying to achieve a situation where all ratings conclude the training process with the same percentage of B-School trained personnel in the inventory. Stated another way, it is desired to distribute a scarce resource, (B-School graduates in the ending inventory), according to the equation

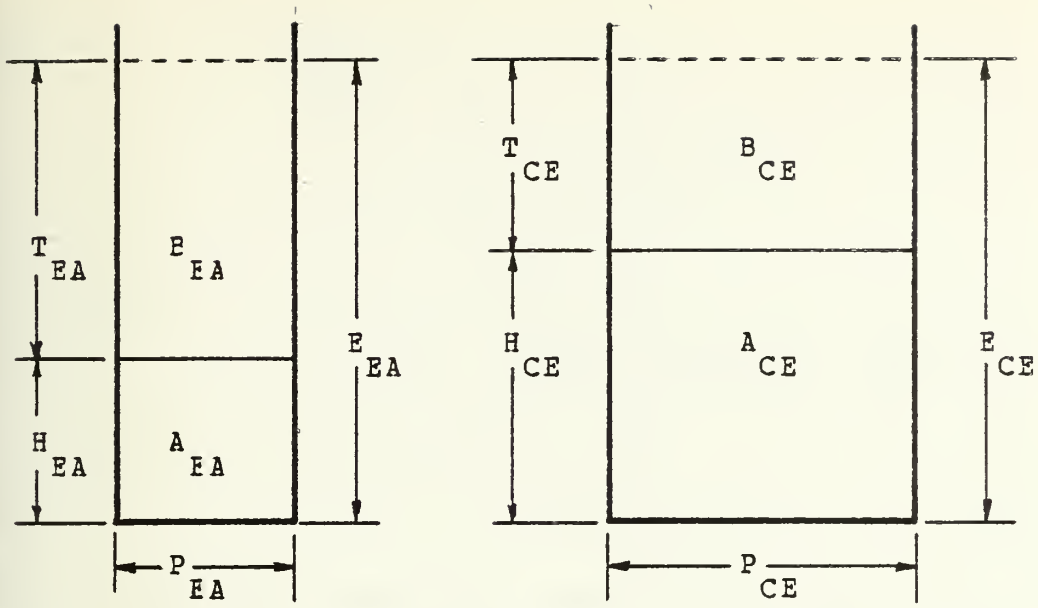
$$\text{(Eq. 1)} \qquad EI_i = P_i(BI + S), \quad (i = EA, CE, \ldots, UT),$$

where EI_i is the number of B-School graduates in the ending inventory of rating i, P_i is the proportionate size of rating i, BI is the total beginning inventory of all ratings and S is the total number trained during the period.

3. A Linear Programming Model

Linear Programming is a ~~Linear Programming is a~~ mathematical technique designed to assist in solutions to problems involving the maximizing or minimizing of functional relationships reduced to linear equations. The problem for which linear programming provides a solution may

be stated as fcllows: Maximize (or minimize) some dependent variable which is a function of several independent variables when the independent variables are subjected to various constraints [Ref. 23]. The B-School planning problem can be represented as shown, utilizing the container analogy explained above. Only two ratings are represented for illustrative purposes:



P_i = Number of E-5 and E-6 in rating (i)

A_i = Initial inventory of graduates in rating (i)

B_i = Number to be trained during the period in rating (i)

H_i = Initial percent trained personnel in rating (i)

T_i = Increase in percent of rating (i) with B-School

SEATS = Total no. to be trained in B-School, all Ratings

E_i = Percent of trained personnel, ending inventory

i = EA, CE, EO, CM, BU, SW, UT

The objective is to obtain the highest percentage of B-School graduates in each rating, that is, to maximize E where $E \leq E_i$, i = EA, CE, EO, CM, BU, SW, UT. Values for P_i, A_i, H_i, and SEATS will normally be known. The problem is therefcre presented in a manner suitable for solution through linear programming procedures. The equations are presented below:

(EQ. 2) MAXIMIZE: E

SUBJECT TO:

$$E = E_i, \quad (i = EO, CE, \ldots, UT)$$

$$T_i + H_i - E_i \geq 0$$

$$B_i - P_i T_i = 0$$

$$\sum B_i = SEATS, \quad (SEATS \text{ is known})$$

$$B_i, T_i, H_i, A_i, P_i, E_i \geq 0$$

All then that is needed to solve the linear programming problem presented is data on the independent variables P, A, and H for each of the ratings, and a projection of the total B-School billet availability. Table XI provides the data which was used to generate the computer solution presented in Table XII.

TABLE XI

PROJECTED B SCHOOL INPUT

FISCAL YEAR 1976

Rating	NCTC P.H.	NCTC, Gulfport	Total
SW	17	16	33
UT	19	19	38
CE	22	23	55
CM	29	29	58
EO	40	40	80
EA	8	8	16
BU	38	32	70
Total	173	167	340

VALUES OF P, A, AND H

DERIVED FROM FY 1975 DATA

GROUP VIII RATINGS

Rating	P	A	H
EA	1.54	28	18.18
CE	6.45	146	22.64
EC	8.11	365	45.01
CM	6.28	191	30.41
EU	10.33	270	26.14
SW	3.26	83	25.46
UT	5.62	148	26.33

Source: Reference 25

TABLE XII

LINEAR PROGRAMMING PRINTOUT

(SEATS FIXED, DETERMINE ALLOCATION)

No.	Column	At	Activity	Input Cost	Lower Limit	Upper Limit	Reduced Cost
25	E	BS	36.0205	1.0	.	NONE	.
26	SEATS	BS	340.0000	.	.	NONE	.
27	BEA	BS	27.4744	.	.	NONE	.
28	BCE	BS	86.3045	.	.	NONE	.
29	BEC	BS	.	.	.	NONE	.
30	BCM	BS	35.2342	.	.	NONE	.
31	BBU	BS	102.0660	.	.	NONE	.
32	BSW	BS	34.4599	.	.	NONE	.
33	BUT	BS	54.4608	.	.	NONE	.
34	TEA	BS	17.8405	.	.	NONE	.
35	TCE	BS	13.3805	.	.	NONE	.
36	TEO	LL	.	.	.	NONE	.242-
37	TCM	BS	5.6105	.	.	NONE	.
38	TEU	BS	9.8805	.	.	NONE	.
39	TSW	BS	10.5705	.	.	NONE	.
40	TUT	BS	9.6905	.	.	NONE	.
41	EEA	BS	36.0205	.	.	NONE	.
42	ECE	BS	36.0205	.	.	NONE	.
43	EEC	BS	36.0205	.	.	NONE	.
44	ECM	BS	36.0205	.	.	NONE	.
45	EBU	BS	36.0205	.	.	NONE	.
46	ESW	BS	36.0205	.	.	NONE	.
47	EUT	BS	36.0205	.	.	NONE	.

Source: Extracted from output generated by IBM 360 utilizing linear programming package MPS/360 V2-M10.

4. Variations in the Model

With only minor variations, the model developed in the previous section can be extended to provide the total number of seats, (quotas), which should be provided when the overall percentage of B-School graduates desired in all ratings is known. The problem can be translated to a linear programming format as follows:

MINIMIZE: SEATS

SUBJECT TO:

$$E_i = E, \text{ (E is known)}$$

$$\sum B_i = SEATS$$

$$B_i = P_i T_i$$

$$T_i + B_i - E_i \geq 0$$

$$B_i, T_i, H_i, A_i, P_i, E_i \geq 0$$

The solution to this problem, utilizing the data presented in previous sections is included as Table XIII.

Further variations and refinements to the model may be developed for specific uses. Additional constraints such as classroom size, instructor availability, optimum class size, specific training requirements in excess of normal, can be handled by this procedure. The model developed will become more complicated as additional constraints are imposed.

TABLE XIII

LINEAR PROGRAMMING PRINTOUT

(PERCENT ATTAINMENT FIXED, FIND SEATS REQUIRED)

No.	Column	At	Activity	Input Cost	Lower Limit	Upper Limit	Reduced Cost
25	E	BS	50.0000	.	.	NONE	.
26	SEATS	BS	848.5011	1.0	.	NONE	.
27	BEA	BS	49.0028	.	.	NONE	.
28	BCE	BS	176.4720	.	.	NONE	.
29	BEC	BS	40.4689	.	.	NONE	.
30	BCM	BS	123.0252	.	.	NONE	.
31	BEU	BS	246.4738	.	.	NONE	.
32	BSW	BS	80.0330	.	.	NONE	.
33	BUT	BS	133.0254	.	.	NONE	.
34	TEA	BS	31.8200	.	.	NONE	.
35	TCE	BS	27.3600	.	.	NONE	.
36	TEC	BS	4.9900	.	.	NONE	.
37	TCM	BS	19.5900	.	.	NONE	.
38	TEU	BS	23.8600	.	.	NONE	.
39	TSW	BS	24.5500	.	.	NONE	.
40	TUT	BS	23.6700	.	.	NONE	.
41	EEA	BS	50.0000	.	.	NONE	.
42	ECE	BS	50.0000	.	.	NONE	.
43	EEC	BS	50.0000	.	.	NONE	.
44	ECM	BS	50.0000	.	.	NONE	.
45	EBU	BS	50.0000	.	.	NONE	.
46	ESW	BS	50.0000	.	.	NONE	.
47	EUT	BS	50.0000	.	.	NONE	.

Source: Extracted from output generated by IBM 360 utilizing linear programming package MPS/360 V2-M10.

IV. RECOMMENDATIONS AND CONCLUSIONS

A. GENERAL CONCLUSIONS

The Group VIII community should be brought under a single management control system. PRCP appears to have the potential to serve the information needs of the system, with SCBT courses acting as the training elements. This action should assist in providing a more efficient training Program without sacrifice of quality.

Adoption of a one-station training concept should eliminate some of the waiting and travel time experienced by personnel during the critical first year in the Navy. This concept appears to deserve additional analysis to determine its feasibility in the present day environment.

B. SPECIFIC RECOMMENDATIONS

1. Transfer SCBT Courses to CNET

The SCBT courses are derived directly from, and are elements of Class A and B-Schools. These short courses have been developed locally by NCTC's and homeport NCR's with little formal recognition by the CNET system. It is recommended that CNET conduct a review of the SCBT Courses as currently offered, and that CNET assume all

responsibility for the conduct of SCBT courses. It is further recommended that SCBT courses be developed for the material promulgated in the C-Schools.

2. Expand PRCP

It is recommended that PRCP be expanded to cover the entire Group VIII rating structure, including billets and personnel both in and out of the NCF. It is further recommended that PRCP data collection be expanded to include information on SCBT and formal schools attended by all Group VIII personnel. Full implementation of this recommendation will enable PRCP to serve as a basis for projecting training requirements, and for establishing a validation procedure to reduce the time individuals must spend in the formal schools.

3. Credit SCBT Courses Completed

Adopting a procedure to allow credit for SCBT courses taken, combined with the expanded inventory procedure recommended above will provide a basis for the validating of course material in the formal school system, and serve to prevent duplicate training. It is further recommended that appropriate PRCP skills be awarded as soon as a formal or SCBT course is completed. In the event an individual demonstrates that he does not possess the skill after having completed the SCBT course, the skill could be removed from his PRCP transcript.

4. Fleets update Skill Requirements

NEC's reflected in the Fleet NCF skill/training

instruction [Ref. 7] should be included in the manpower authorization documents for all NCF Units. The skills required by a unit should be expressed as a finite requirement, not as a "minimum " or "target" as is presently the case. The requirements for all NCF units, including command staffs, regiments, battalions and teams should be developed.

5. Utilize Linear Programming Models

Utilization of the linear programming models developed in this paper, or of more complex models based on this concept, should assist managers in allocating training billets among the individuals or commands desiring the training. The goal in this procedure is determining what courses to present, and who will attend them, so that the optimum use of the training dollar can be obtained.

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

(Page 1 of 7)

BUILDER

Course No.	Title	Length (Weeks)	Skill Level Attained
BU-1	Blueprint Reading and Building Layout	1	1
BU-2	Woodworking and Millwork	1	1
BU-3	Light Frame Construction (Basic)	2	1
BU-4	Roofing, Painting, Glazing, and Composition Tile (Basic)	1	1
BU-5	Masonry Construction (Basic)	1	1
BU-6	Concrete Construction (Basic)	2	1
BU-7	Field and Waterfront Structures	1	1
BU-10	Concrete Construction	2	2
BU-11	Shop Machinery	2	2
BU-12	Light Frame Construction (Advanced)	2	2
BU-13	Roofing, Painting, Glazing, and Composition Tile (Advanced)	1	2
BU-14	Masonry Construction	1	2
BU-15	Plastering and Ceramic Tile	1	2
BU-16	Advanced Base and Waterfront Structures	2	2
BU-17	Foremanship	1	2
BU-18	Project Planning	2	2

Source: Reference 12

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

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STEELWORKER

Course No.	Title	Length (Weeks)	Skill Level Attained
SW-1	Mathematics, Blueprint reading and Sketching	1	1
SW-2	Sheetmetal Layout and Shop	2	1
SW-3	Metal Working and Gas Cutting	1	1
SW-4	Gas Cutting	1	1
SW-5	Arc Welding	2	1
SW-6	Basic Fiber Line	1	1
SW-7	Basic Wire Rope	1	1
SW-8	Steel Erection	2	1
SW-10	Advanced Sheetmetal Layout	2	2
SW-11	Advanced Gas Welding	1	2
SW-12	Advanced Arc Welding	2	2
SW-13	Pipe Layout and Welding	2	2
SW-14	MIG Welding Aluminum and Steel	2	2
SW-15	TIG Welding Aluminum and Stainless Steel	2	2
SW-16	Maintenance Welding Techniques	2	2
SW-17	Advanced Fiber Line	1	2
SW-18	Advanced Wire Rope	2	2
SW-19	Planning and Estimating	2	2

Source: Reference 12

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

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EQUIPMENT OPERATOR

Course No.	Title	Length (Weeks)	Skill Level Attained
EO-1	Autcmatic Vehicles	2	1
EO-2	Front-end Loaders and Forklifts	1	1
EC-3	Gradework	1/2	1
EO-4	Motcr Graders	1	1
EC-5	Crawler Tractors	2	1
EC-6	Scrapers	2	1
EC-10	Gradework and Planning and Estimating	1	2
EO-11	Dozers and Scrapers	3	2
EC-12	Cranes and Attachments	4	2
EC-13	Asphalt Paving Construction	4	2
EO-14	Rock Crushing Operation	2	2
EO-15	Trerching Equipment Operation	1	2

Source: Reference 12

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

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CONSTRUCTION MECHANIC

Course No.	Title	Length (Weeks)	Skill Level Attained
CM-1	Autcmotive Electricity	1	1
CM-2	Equipment Work Order	1 da	1
CM-3	Internal Combustion Engines	2	1
CM-4	Tactical Vehicle Maintenance	2	1
CM-5	Fluid Power and Parker Hose Assembly	1	1
CM-6	Air Compressors and Pneumatic Tools	1	1
CM-7	International TD 20 Series "B" Crawler Tractor	1	1
CM-8	Gallicn Model 118T Motor Grader	1	1
CM-9	Pettibone Model OSS-3354.RT 6000 Forklift	1	1
CM-10	Engine Analysis (Engine Electrical System)	2	2
CM-11	GM Series "71" Diesel Engine	1	2
CM-12	Multifuel Engine Model LD-465-1	1	2
CM-13	Roosa Master Fuel Injection System	1	2
CM-14	MRS I-110 Diesel Wheel Tractor	1	2
CM-15	Euclid Model TS 24 Scraper	1	2
CM-16	Construction Equipment Power-shift Transmissions	2	2

Source: Reference 12

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

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CONSTRUCTION ELECTRICIAN

Course No.	Title	Length (Weeks)	Skill Level Attained
CE-1	Mathematics and Electricity	2	1
CE-2	Motors and Generators	2	1
CE-3	Communications	2	1
CE-4	Interior Wiring	2	1
CE-5	Power Distribution	2	1
CE-10	Applied Mathematics	1	2
CE-11	Electrical Theory	2	2
CE-12	Power Distribution	2	2
CE-13	Interior Wiring	2	2
CE-14	Communications	2	2
CE-15	Electrical Power Plant Operation and Maintenance	2	2
CE-16	Alternating Current Motors	2	2

Source: Reference 12

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

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UTILITIESMAN

Course No.	Title	Length (Weeks)	Skill Level Attained
UT-1	Basic Plumbing	2	1
UT-2	Plumbing Cast Iron Soil Pipe	2	1
UT-3	Finish Plumbing and Pipe Insulation	1	1
UT-4	Pumps and Compressors	1	1
UT-5	Water Treatment and Sewage and Refuse Disposal	2	1
UT-6	Refrigeration	2	1
UT-7	Boilers	2	1
UT-10	Foremanship and Mathematics	1	2
UT-11	Designing Isometric Drawings and Computing Material Take-off	1	2
UT-12	Isometric Drawings, Material Take-off and Critical Path	1	2
UT-13	Sewage and Refuse Disposal	1	2
UT-14	Internal Combustion Engines and Pump Repair	1	2
UT-15	Water Purification and Distillation	2	2
UT-16	Boilers and Related Systems	1	2
UT-17	Boiler Maintenance and Repair	2	2
UT-18	Refrigeration	2	2
UT-19	Air Conditioning	2	2

Source: Reference 12

APPENDIX A

SPECIAL SEABEE TRAINING COURSES

(Page 7 of 7)

ENGINEERING AID

Course No.	Title	Length (Weeks)	Skill Level Attained
EA-1	Materials Quality Control	1	1
EA-2	Basic Drafting	2	1
EA-3	Construction Drafting	3	1
EA-4	Basic Surveying	1	1
EA-5	Surveying Instruments	1	1
EA-6	Topographic Surveying	2	1
EA-7	Engineering Surveys	2	1

Source: Reference 12

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

(Page 1 of 7)

BUILDER

Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
103 Planning and Estimating	12/17	3b/5b	-
108 Tool and Equipment Maint.	2a/4a	-	-
110 Woodworking and Millworking	22/30	2c/4c	-
130 Concrete Forming and Reinforcing	36/47	21/28	5d/7d
132 Mixing, Placing, Finishing Concrete	36/47	21/28	5d/7d
140 Masonry Unit Construction	36/47	21/28	5e/7e
150 Light Frame Construction	42/56	20/26	-
162 Roofing	9/12	-	-
164 Finish Carpentry	20/26	9/12	-
166 Plastering	24/31	5e/7e	-
167 Ceramic Tile Setting	5e/7e	-	-
170 Heavy Construction	34/45	21/27	7f/10f
190 Painting and Preservation	33/44	20/26	2/5
198 Glazing	20/26	9/12	-

FOOTNOTES:

a - NEC BU-5908, Tool and Equipment Technician
b - NEC BU-5515, Planner and Estimator
c - NEC BU-5904, Millworker
d - NEC BU-5901, Concrete Technician
e - NEC BU-5902, Masonry Technician
f - NEC BU-5906, Heavy Construction Technician

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

(Page 2 of 7)

CONSTRUCTION ELECTRICIAN

	Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
203	Planning and Estimating	4/5	1a/2a	-
212	Shore Based Power Plant Technician	11/14	6/8	3b/4b
216	Electric Motors and Controls	11/14	6/8	2/3
220	Electric Power Distribution Systems	15/19	6/8	3/4
231	Telephone Exchange and Distribution Systems	6/8	-	-
234	Inter-office and Public Address systems	3/4	-	-
237	Cable Splicing	6/8	3c/4c	-
240	Interior Wiring	20/26	4/5	-
250	Motor and Generator Rewinding	3/4	-	-

FOOTNOTES:

a - NEC EA-5515 Planner and Estimator
b - NEC CE-5632 Shore Based Power Plant Technician
c - NEC CE-5644 Cable Splicing Technician

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

(Page 3 of 7)

CONSTRUCTION MECHANIC

Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
325 Engine Overhaul	11/14	6/8	3/4
332 Engine Tune-up (Gasoline)	11/14	6/8	3/4
334 Engine Tune-up (Diesel)	11/14	6/8	3/4
345 Equipment Electrical	11/14	6/8	2a/3a
355 Equipment Power Train	9/10	6/8	6b/8b
365 Equipment Chassis	11/14	6/8	3/4

FOOTNOTES:

a - NEC CM-5802, Automotive Electrical Technician
b - NEC CM-5801, Automatic Transmissions/Hydraulic Systems Mechanic

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

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ENGINEERING AID

Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
400 Applied Engineering			
403 Planning and Estimating	3/4	1a/2a	-
410 Surveying	5/6	1/2	-
420 Drafting	5/6	1/2	-
440 Materials Testing	4/5	2b/3b	-

FOOTNOTES:

a - NEC EA-5515, Planner and Estimator
b - NEC EA-5502, Soils and Pavement Analysis

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

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EQUIPMENT OPERATOR

Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
515 Tractor and Trailer Operation	33/44	8/10	-
521 Asphalt Paving and Plant Operation	13/17	4a/6a	-
521 Asphalt Distributor Operation	5/7	-	-
523 Crushing and Screening Operations	3b/5b	-	-
526 Soil Stabilization	6/17	4c/6c	-
530 Water Well Drilling	3d/5d	-	-
532 Power Earth Auger	5/7	-	-
536 Rock Drill Operation	5/7	-	-
540 Crane and Attachments	10/13	7/9	1/2
542 Scraper Operation	26/34	10/15	-
544 Grader Operation	10/13	7/9	1/2
546 Crawler Tractor and Attachments	33/44	8/10	-
548 Ditcher Operation	13/17	5/7	-
549 Front-end Loader and Attachments	33/44	8/10	-
585 Blasting and Quarry Operations	5e/7e	-	-

FOOTNOTES:

a - NEC EO-5712, Asphalt Paving and Plant Operating Technician
b - NEC EO-5709, Crushing and Screening Plant Technician
c - NEC EO-5711, Grade Foreman
d - NEC EO-5707, Water Well Drilling
e - NEC EO-5708, Blaster

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

(Page 6 of 7)

STEELWORKER

Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
603 Planning and Estimating	3/4	1c/2c	-
610 Arc Welding (Structural)	16/22	6/8	3d*/4d*
612 Arc Welding (Pipe)	5/7	3e*/4e*	-
615 Gas Cutting and Welding	16/22	6/8	-
618 Inert-Gas Arc Welding	5/7	2*/3*	-
619 Maintenance Welding	4b/6b	-	-
620 Sheetmetal Work	5/7	2a/3a	-
630 Steel Reinforcing	13/18	2/3	-
634 Rigging	5/7	2/3	-
635 Steel Erection	13/18	2/3	-

FOOTNOTES:

* - Certified Welding, requires annual re-certification
a - NEC SW-6017, Sheetmetal Technician
b - NEC SW6012, Maintenance Welder
c - NEC EA-5515, Planner and Estimater
d - NEC SW-6013, Certified Structural Welder
e - NEC SW-6014, Certified Pipe Welder

APPENDIX B

SKILL REQUIREMENTS FOR NMCB'S

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UTILITIESMAN

	Skill Title	Skill Level-1 Min/Tgt	Skill Level-2 Min/Tgt	Skill Level-3 Min/Tgt
703	Planning and Estimating	3/5	1a/2a	-
710	Plumbing	16/21	6/8	-
720	Shore Based Boilers	6/8	2/3	3b/4b
730	Pumps and Compressors	12/15	4/6	-
740	Water Treatment	6/8	2/3	2/3
750	Sewage Disposal and Field Sanitation	6/8	2/3	-
760	Air Conditioning and Refrigeration	6/8	3c/4c	-
770	Petroleum Handling and Storage	2d/3d	-	-

FOOTNOTES:

a - NEC EA-5515, Planner and Estimater
b - NEC UT-6102, Shore Based Boiler Controls Technician
c - NEC MM-4294, Refrigeration and Air Conditioning Mechanic
d - NEC UT-6117, Petroleum Tank Farm Technician

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